INSTALLATION AND OPERATION MANUAL

ETX-204A

Carrier Ethernet Demarcation Device

Version 2.2

EtherAccess

SyncToP

CARRIER ETHERNET MEF Certified Compliant

RAD data communications
The Access Company

ETX-204A

Carrier Ethernet Demarcation Device

Version 2.2

Installation and Operation Manual

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Product Disposal

To facilitate the reuse, recycling and other forms of recovery of waste equipment in protecting the environment, the owner of this RAD product is required to refrain from disposing of this product as unsorted municipal waste at the end of its life cycle. Upon termination of the unit's use, customers should provide for its collection for reuse, recycling or other form of environmentally conscientious disposal.

General Safety Instructions

The following instructions serve as a general guide for the safe installation and operation of telecommunications products. Additional instructions, if applicable, are included inside the manual.

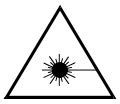
Safety Symbols

Warning

This symbol may appear on the equipment or in the text. It indicates potential safety hazards regarding product operation or maintenance to operator or service personnel.

Danger of electric shock! Avoid any contact with the marked surface while the product is energized or connected to outdoor telecommunication lines.

Protective ground: the marked lug or terminal should be connected to the building protective ground bus.



Warning

Some products may be equipped with a laser diode. In such cases, a label with the laser class and other warnings as applicable will be attached near the optical transmitter. The laser warning symbol may be also attached.

Please observe the following precautions:

- Before turning on the equipment, make sure that the fiber optic cable is intact and is connected to the transmitter.
- Do not attempt to adjust the laser drive current.
- Do not use broken or unterminated fiber-optic cables/connectors or look straight at the laser beam.
- The use of optical devices with the equipment will increase eye hazard.
- Use of controls, adjustments or performing procedures other than those specified herein, may result in hazardous radiation exposure.

ATTENTION: The laser beam may be invisible!

In some cases, the users may insert their own SFP laser transceivers into the product. Users are alerted that RAD cannot be held responsible for any damage that may result if non-compliant transceivers are used. In particular, users are warned to use only agency approved products that comply with the local laser safety regulations for Class 1 laser products.

Always observe standard safety precautions during installation, operation and maintenance of this product. Only qualified and authorized service personnel should carry out adjustment, maintenance or repairs to this product. No installation, adjustment, maintenance or repairs should be performed by either the operator or the user.

Handling Energized Products

General Safety Practices

Do not touch or tamper with the power supply when the power cord is connected. Line voltages may be present inside certain products even when the power switch (if installed) is in the OFF position or a fuse is blown. For DC-powered products, although the voltages levels are usually not hazardous, energy hazards may still exist.

Before working on equipment connected to power lines or telecommunication lines, remove jewelry or any other metallic object that may come into contact with energized parts.

Unless otherwise specified, all products are intended to be grounded during normal use. Grounding is provided by connecting the mains plug to a wall socket with a protective ground terminal. If a ground lug is provided on the product, it should be connected to the protective ground at all times, by a wire with a diameter of 18 AWG or wider. Rack-mounted equipment should be mounted only in grounded racks and cabinets.

Always make the ground connection first and disconnect it last. Do not connect telecommunication cables to ungrounded equipment. Make sure that all other cables are disconnected before disconnecting the ground.

Some products may have panels secured by thumbscrews with a slotted head. These panels may cover hazardous circuits or parts, such as power supplies. These thumbscrews should therefore always be tightened securely with a screwdriver after both initial installation and subsequent access to the panels.

Connecting AC Mains

Make sure that the electrical installation complies with local codes.

Always connect the AC plug to a wall socket with a protective ground.

The maximum permissible current capability of the branch distribution circuit that supplies power to the product is 16A (20A for USA and Canada). The circuit breaker in the building installation should have high breaking capacity and must operate at short-circuit current exceeding 35A (40A for USA and Canada).

Always connect the power cord first to the equipment and then to the wall socket. If a power switch is provided in the equipment, set it to the OFF position. If the power cord cannot be readily disconnected in case of emergency, make sure that a readily accessible circuit breaker or emergency switch is installed in the building installation.

In cases when the power distribution system is IT type, the switch must disconnect both poles simultaneously.

Connecting DC Power

Unless otherwise specified in the manual, the DC input to the equipment is floating in reference to the ground. Any single pole can be externally grounded.

Due to the high current capability of DC power systems, care should be taken when connecting the DC supply to avoid short-circuits and fire hazards.

Make sure that the DC power supply is electrically isolated from any AC source and that the installation complies with the local codes.

The maximum permissible current capability of the branch distribution circuit that supplies power to the product is 16A (20A for USA and Canada). The circuit breaker in the building installation should have high breaking capacity and must operate at short-circuit current exceeding 35A (40A for USA and Canada).

Before connecting the DC supply wires, ensure that power is removed from the DC circuit. Locate the circuit breaker of the panel board that services the equipment and switch it to the OFF position. When connecting the DC supply wires, first connect the ground wire to the corresponding terminal, then the positive pole and last the negative pole. Switch the circuit breaker back to the ON position.

A readily accessible disconnect device that is suitably rated and approved should be incorporated in the building installation.

If the DC power supply is floating, the switch must disconnect both poles simultaneously.

Connecting Data and Telecommunications Cables

Data and telecommunication interfaces are classified according to their safety status.

The following table lists the status of several standard interfaces. If the status of a given port differs from the standard one, a notice will be given in the manual.

Ports	Safety Status	
V.11, V.28, V.35, V.36, RS-530, X.21, 10 BaseT, 100 BaseT, Unbalanced E1, E2, E3, STM, DS-2, DS-3, S-Interface ISDN, Analog voice E&M	SELV	Safety Extra Low Voltage: Ports which do not present a safety hazard. Usually up to 30 VAC or 60 VDC.
xDSL (without feeding voltage), Balanced E1, T1, Sub E1/T1	TNV-1	Telecommunication Network Voltage-1: Ports whose normal operating voltage is within the limits of SELV, on which overvoltages from telecommunications networks are possible.
FXS (Foreign Exchange Subscriber)	TNV-2	Telecommunication Network Voltage-2: Ports whose normal operating voltage exceeds the limits of SELV (usually up to 120 VDC or telephone ringing voltages), on which overvoltages from telecommunication networks are not possible. These ports are not permitted to be directly connected to external telephone and data lines.
FXO (Foreign Exchange Office), xDSL (with feeding voltage), U-Interface ISDN	TNV-3	Telecommunication Network Voltage-3: Ports whose normal operating voltage exceeds the limits of SELV (usually up to 120 VDC or telephone ringing voltages), on which overvoltages from telecommunication networks are possible.

Always connect a given port to a port of the same safety status. If in doubt, seek the assistance of a qualified safety engineer.

Always make sure that the equipment is grounded before connecting telecommunication cables. Do not disconnect the ground connection before disconnecting all telecommunications cables.

Some SELV and non-SELV circuits use the same connectors. Use caution when connecting cables. Extra caution should be exercised during thunderstorms.

When using shielded or coaxial cables, verify that there is a good ground connection at both ends. The grounding and bonding of the ground connections should comply with the local codes.

The telecommunication wiring in the building may be damaged or present a fire hazard in case of contact between exposed external wires and the AC power lines. In order to reduce the risk, there are restrictions on the diameter of wires in the telecom cables, between the equipment and the mating connectors.

Caution To reduce the risk of fire, use only No. 26 AWG or larger telecommunication line cords.

Attention Pour réduire les risques s'incendie, utiliser seulement des conducteurs de télécommunications 26 AWG ou de section supérieure.

Some ports are suitable for connection to intra-building or non-exposed wiring or cabling only. In such cases, a notice will be given in the installation instructions.

Do not attempt to tamper with any carrier-provided equipment or connection hardware.

Electromagnetic Compatibility (EMC)

The equipment is designed and approved to comply with the electromagnetic regulations of major regulatory bodies. The following instructions may enhance the performance of the equipment and will provide better protection against excessive emission and better immunity against disturbances.

A good ground connection is essential. When installing the equipment in a rack, make sure to remove all traces of paint from the mounting points. Use suitable lock-washers and torque. If an external grounding lug is provided, connect it to the ground bus using braided wire as short as possible.

The equipment is designed to comply with EMC requirements when connecting it with unshielded twisted pair (UTP) cables. However, the use of shielded wires is always recommended, especially for high-rate data. In some cases, when unshielded wires are used, ferrite cores should be installed on certain cables. In such cases, special instructions are provided in the manual.

Disconnect all wires which are not in permanent use, such as cables used for one-time configuration.

The compliance of the equipment with the regulations for conducted emission on the data lines is dependent on the cable quality. The emission is tested for UTP with 80 dB longitudinal conversion loss (LCL).

Unless otherwise specified or described in the manual, TNV-1 and TNV-3 ports provide secondary protection against surges on the data lines. Primary protectors should be provided in the building installation.

The equipment is designed to provide adequate protection against electro-static discharge (ESD). However, it is good working practice to use caution when connecting cables terminated with plastic connectors (without a grounded metal hood, such as flat cables) to sensitive data lines. Before connecting such cables, discharge yourself by touching ground or wear an ESD preventive wrist strap.

FCC-15 User Information

This equipment has been tested and found to comply with the limits of the Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the Installation and Operation manual, may cause harmful interference to the radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Canadian Emission Requirements

This Class A digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulation.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Warning per EN 55022 (CISPR-22)

Warning	This is a class A product. In a domestic environment, this product may cause radio interference, in which case the user will be required to take adequate measures.
Avertissement	Cet appareil est un appareil de Classe A. Dans un environnement résidentiel, cet appareil peut provoquer des brouillages radioélectriques. Dans ces cas, il peut être demandé à l'utilisateur de prendre les mesures appropriées.
Achtung	Das vorliegende Gerät fällt unter die Funkstörgrenzwertklasse A. In Wohngebieten können beim Betrieb dieses Gerätes Rundfunkströrungen auftreten, für deren Behebung der Benutzer verantwortlich ist.

Mise au rebut du produit

Afin de faciliter la réutilisation, le recyclage ainsi que d'autres formes de récupération d'équipement mis au rebut dans le cadre de la protection de l'environnement, il est demandé au propriétaire de ce produit RAD de ne pas mettre ce dernier au rebut en tant que déchet municipal non trié, une fois que le produit est arrivé en fin de cycle de vie. Le client devrait proposer des solutions de réutilisation, de recyclage ou toute autre forme de mise au rebut de cette unité dans un esprit de protection de l'environnement, lorsqu'il aura fini de l'utiliser.

Instructions générales de sécurité

Les instructions suivantes servent de guide général d'installation et d'opération sécurisées des produits de télécommunications. Des instructions supplémentaires sont éventuellement indiquées dans le manuel.

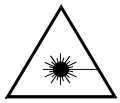
Symboles de sécurité

Avertissement

Ce symbole peut apparaitre sur l'équipement ou dans le texte. Il indique des risques potentiels de sécurité pour l'opérateur ou le personnel de service, quant à l'opération du produit ou à sa maintenance.

Danger de choc électrique ! Evitez tout contact avec la surface marquée tant que le produit est sous tension ou connecté à des lignes externes de télécommunications.

Mise à la terre de protection : la cosse ou la borne marquée devrait être connectée à la prise de terre de protection du bâtiment.



Avertissement

Certains produits peuvent être équipés d'une diode laser. Dans de tels cas, une étiquette indiquant la classe laser ainsi que d'autres avertissements, le cas échéant, sera jointe près du transmetteur optique. Le symbole d'avertissement laser peut aussi être joint.

Veuillez observer les précautions suivantes :

- Avant la mise en marche de l'équipement, assurez-vous que le câble de fibre optique est intact et qu'il est connecté au transmetteur.
- Ne tentez pas d'ajuster le courant de la commande laser.
- N'utilisez pas des câbles ou connecteurs de fibre optique cassés ou sans terminaison et n'observez pas directement un rayon laser.
- L'usage de périphériques optiques avec l'équipement augmentera le risque pour les yeux.
- L'usage de contrôles, ajustages ou procédures autres que celles spécifiées ici pourrait résulter en une dangereuse exposition aux radiations.

ATTENTION : Le rayon laser peut être invisible !

Les utilisateurs pourront, dans certains cas, insérer leurs propres émetteurs-récepteurs Laser SFP dans le produit. Les utilisateurs sont avertis que RAD ne pourra pas être tenue responsable de tout dommage pouvant résulter de l'utilisation d'émetteurs-récepteurs non conformes. Plus particulièrement, les utilisateurs sont avertis de n'utiliser que des produits approuvés par l'agence et conformes à la réglementation locale de sécurité laser pour les produits laser de classe 1.

Respectez toujours les précautions standards de sécurité durant l'installation, l'opération et la maintenance de ce produit. Seul le personnel de service qualifié et autorisé devrait effectuer l'ajustage, la maintenance ou les réparations de ce produit. Aucune opération d'installation, d'ajustage, de maintenance ou de réparation ne devrait être effectuée par l'opérateur ou l'utilisateur.

Manipuler des produits sous tension

Règles générales de sécurité

Ne pas toucher ou altérer l'alimentation en courant lorsque le câble d'alimentation est branché. Des tensions de lignes peuvent être présentes dans certains produits, même lorsque le commutateur (s'il est installé) est en position OFF ou si le fusible est rompu. Pour les produits alimentés par CC, les niveaux de tension ne sont généralement pas dangereux mais des risques de courant peuvent toujours exister.

Avant de travailler sur un équipement connecté aux lignes de tension ou de télécommunications, retirez vos bijoux ou tout autre objet métallique pouvant venir en contact avec les pièces sous tension.

Sauf s'il en est autrement indiqué, tous les produits sont destinés à être mis à la terre durant l'usage normal. La mise à la terre est fournie par la connexion de la fiche principale à une prise murale équipée d'une borne protectrice de mise à la terre. Si une cosse de mise à la terre est fournie avec le produit, elle devrait être connectée à tout moment à une mise à la terre de protection par un conducteur de diamètre 18 AWG ou plus. L'équipement monté en châssis ne devrait être monté que sur des châssis et dans des armoires mises à la terre.

Branchez toujours la mise à la terre en premier et débranchez-la en dernier. Ne branchez pas des câbles de télécommunications à un équipement qui n'est pas mis à la terre. Assurez-vous que tous les autres câbles sont débranchés avant de déconnecter la mise à la terre.

Connexion au courant du secteur

Assurez-vous que l'installation électrique est conforme à la réglementation locale.

Branchez toujours la fiche de secteur à une prise murale équipée d'une borne protectrice de mise à la terre.

La capacité maximale permissible en courant du circuit de distribution de la connexion alimentant le produit est de 16A (20A aux Etats-Unis et Canada). Le coupe-circuit dans l'installation du bâtiment devrait avoir une capacité élevée de rupture et devrait fonctionner sur courant de court-circuit dépassant 35A (40A aux Etats-Unis et Canada).

Branchez toujours le câble d'alimentation en premier à l'équipement puis à la prise murale. Si un commutateur est fourni avec l'équipement, fixez-le en position OFF. Si le câble d'alimentation ne peut pas être facilement débranché en cas d'urgence, assurez-vous qu'un coupe-circuit ou un disjoncteur d'urgence facilement accessible est installé dans l'installation du bâtiment.

Le disjoncteur devrait déconnecter simultanément les deux pôles si le système de distribution de courant est de type IT.

Connexion d'alimentation CC

Sauf s'il en est autrement spécifié dans le manuel, l'entrée CC de l'équipement est flottante par rapport à la mise à la terre. Tout pôle doit être mis à la terre en externe.

A cause de la capacité de courant des systèmes à alimentation CC, des précautions devraient être prises lors de la connexion de l'alimentation CC pour éviter des courts-circuits et des risques d'incendie.

Assurez-vous que l'alimentation CC est isolée de toute source de courant CA (secteur) et que l'installation est conforme à la réglementation locale.

La capacité maximale permissible en courant du circuit de distribution de la connexion alimentant le produit est de 16A (20A aux Etats-Unis et Canada). Le coupe-circuit dans l'installation du bâtiment devrait avoir une capacité élevée de rupture et devrait fonctionner sur courant de court-circuit dépassant 35A (40A aux Etats-Unis et Canada).

Avant la connexion des câbles d'alimentation en courant CC, assurez-vous que le circuit CC n'est pas sous tension. Localisez le coupe-circuit dans le tableau desservant l'équipement et fixez-le en position OFF. Lors de la connexion de câbles d'alimentation CC, connectez d'abord le conducteur de mise à la terre à la borne correspondante, puis le pôle positif et en dernier, le pôle négatif. Remettez le coupe-circuit en position ON.

Un disjoncteur facilement accessible, adapté et approuvé devrait être intégré à l'installation du bâtiment.

Le disjoncteur devrait déconnecter simultanément les deux pôles si l'alimentation en courant CC est flottante.

Contents

Chapter 1. Introduction

1.1 Overview....1-1
Device Options....1-2
Applications....1-2
Features....1-4
Service Types....1-4
Service Level Agreement (SLA) Monitoring....1-4
Flow Classification....1-4
Tagging and Marking....1-5
Quality of Service (QoS)....1-6
Traffic Prioritization....1-6
Queue Mapping and Marking....1-7
Hierarchical Scheduling and Shaping Per Flow....1-7
Handling the Traffic Flow....1-7
Ethernet OAM....1-8
Jumbo Frames and Egress MTU....1-8
Link Redundancy....1-8
L2CP Handling....1-8
Fault Propagation....1-9
Management....1-9
DHCP Client....1-10
SFTP....1-10
Statistics Collection....1-10
Synchronous Ethernet Timing....1-10
Network Time Protocol....1-10
Diagnostic Tools....1-10
1.2 What's New in This Version....1-12
1.3 Physical Description....1-13
1.4 Technical Specifications....1-14

Chapter 2. Installation and Setup

2.1 Site Requirements and Prerequisites....2-1
2.2 Package Contents....2-2
2.3 Mounting the Unit....2-2
2.4 Installing SFP Modules....2-2
2.5 Connecting to Ethernet Equipment....2-3
2.6 Connecting to External Clock Source....2-4
Connecting to a Balanced Clock Source....2-5
Connecting to an Unbalanced Clock Source....2-5
2.7 Connecting to ASCII Terminal....2-5
2.8 Connecting to Management Port....2-6
2.9 Connecting to Power....2-7
Connecting to AC Power....2-7
Connecting to DC Power....2-7

Chapter 3. Operation

3.1 Turning On the Unit....3-1
3.2 Indicators....3-2

3.3 Configuration and Management Alternatives 3-2
Working with Terminal 3-3
Logging In 3-7
Using the CLI 3-8
Command Tree 3-10
Working with RADview 3-22
3.4 Startup 3-23
Configuration Files 3-23
Loading Sequence 3-23
3.5 Using a Custom Configuration File 3-24
3.6 Turning Off the Unit 3-25

Chapter 4. Configuration

4.1 Management Connectivity 4-2
Configuring the Host IP Settings 4-2
Working with DHCP 4-2
Setting Host IP Parameters 4-3
Configuring Device Information 4-4
Configuring for SNMP Management 4-5
SNMP Default Configuration 4-5
Enabling or Disabling SNMPv3 4-6
Setting SNMP Communities 4-6
SNMPv3 Default Configuration 4-6
Configuring SNMPv3 Parameters 4-7
Configuring Network Managers 4-15
Configuring Management Subnets 4-16
Configuring Network Manager Stations 4-16
Masking Traps to Network Managers 4-16
Controlling Management Access 4-17
Defining the Access Policy 4-18
Working with RADIUS 4-19
Configuring Radius Server Parameters 4-19
Displaying RADIUS Statistics 4-20
Configuring Control Port Parameters 4-20
Configuring User Access 4-21
4.2 Ethernet Ports 4-23
Configuring Ethernet Port Parameters 4-24
Setting Second Network Interface as Network or User Port 4-26
Configuring the Layer 2 Control Processing 4-26
Default Layer 2 Control Processing Profile 4-27
Adding Layer 2 Control Processing Profiles 4-27
Deleting Layer 2 Control Processing Profiles 4-27
Configuring Layer 2 Control Processing Profiles 4-28
Displaying Ethernet Port Status 4-28
Testing Ethernet Ports 4-29
Displaying Ethernet Port Statistics 4-30
Setting Sampling Interval for Port Statistics 4-30
Displaying Port Statistics 4-30
Displaying Layer-2 Control Processing Statistics 4-32
Clearing Statistics 4-33
4.3 Network Interface Redundancy 4-33
Link Aggregation 4-34
1:1 Bidirectional Redundancy 4-34

Configuring LAG 4-35
Configuring Link Protection 4-39
4.4 Quality of Service (QoS) 4-41
Configuring Queue Mapping Profiles 4-41
Default Configuration 4-41
Adding Queue Mapping Profiles 4-42
Configuring Queue Mappings 4-43
Configuring Marking Profiles 4-44
Configuring Bandwidth Profiles 4-46
Default Bandwidth Profiles 4-46
Configuring Shaper Profiles 4-47
Configuring Policer Profiles 4-48
Configuring Policer Aggregates 4-49
Configuring Queue Block Profiles 4-50
Default Queue Block Profile 4-51
Adding Queue Block Profiles 4-51
Configuring Queue Block Profile Parameters 4-51
Configuring Queue Group Profiles 4-52
Adding Queue Group Profiles 4-52
Configuring Queue Group Profile Parameters 4-52
Configuring WRED Profiles 4-53
4.5 Flows 4-54
Defining Classifier Profiles 4-61
Configuring Flows 4-62
Configuring Management Flows 4-65
Testing Flows 4-66
Displaying Flow Statistics 4-66
4.6 Ethernet OAM 4-67
Configuring OAM CFM (Connectivity Fault Management) 4-67
Configuring Maintenance Domains 4-67
Configuring Maintenance Associations 4-69
Configuring Maintenance Endpoints 4-70
Configuring Maintenance Endpoint Services 4-73
Configuring Destination NEs 4-74
Configuring OAM CFM Service Event Reporting 4-74
Displaying OAM CFM Statistics 4-76
Configuring OAM EFM 4-80
4.7 Clock Selection 4-82
Configuring the Clock Domain 4-82
Configuring the Clock Sources 4-85
Configuring the Station Clock 4-87
4.8 Fault Propagation 4-87
Default Configuration 4-88
Configuring Fault Propagation 4-88
Adding Fault Propagation Entry 4-88
Configuring Fault Propagation Parameters 4-89
Disabling Fault Propagation 4-91
4.9 Date and Time 4-91
Setting the Date and Time 4-91
Displaying the Date and Time 4-92
Working with SNTP 4-92
Default Configuration 4-92
Configuring SNTP Parameters 4-92
Defining SNTP Servers 4-93

Configuring SNTP Server Parameters 4-93
4.10 Syslog 4-95
Configuring Syslog Parameters 4-95
Displaying Syslog Statistics 4-96
4.11 Configuring Temperature Threshold 4-96
4.12 Clearing Device Statistics 4-97
4.13 Administration 4-97
Working with the Inventory 4-97
Standards and MIBs 4-97
Benefits 4-98
Displaying Inventory Information 4-98
Setting Administrative Inventory Information 4-100
Example 4-100
Displaying Environment 4-103
Displaying Software Versions 4-104
Displaying CPU and Memory Utilization 4-104
File Operations 4-105
Downloading/Uploading Files 4-106
Using CLI to Download/Upload Files 4-108
Copying Files Within Device 4-109
Displaying Files Within Device 4-109
Swapping Files 4-110
Deleting Files 4-110
Saving Configuration 4-111
Reset 4-111
Resetting to Factory Defaults 4-111
Resetting to User Defaults 4-111
Restarting the Unit 4-112

Chapter 5. Monitoring and Diagnostics

5.1 Detecting Problems 5-1
LEDs 5-1
Alarms and Traps 5-1
5.2 Handling Events 5-1
Working with the Event Log 5-1
Working with Traps 5-4
Setting the Trap Delay 5-6
Masking Traps 5-6
Working with Trap Synchronization 5-7
5.3 Running a Ping Test 5-9
5.4 Tracing the Route 5-9
5.5 Technical Support 5-10

Chapter 6. Software Upgrade

6.1 Compatibility Requirements 6-1
6.2 Impact 6-2
6.3 Software Upgrade Options 6-2
6.4 Prerequisites 6-2
Software Files 6-2
System Requirements 6-2
6.5 Upgrading the Device Software via CLI 6-3
Verifying the Host Parameters 6-3

Pinging the PC 6-3
Activating the SFTP Server 6-4
Activating the TFTP Server 6-4
Downloading the New Software Release File 6-4
6.6 Upgrading the Device Software via the Boot Menu 6-5
Accessing the Boot Menu 6-5
Using the XMODEM Protocol 6-6
Using TFTP 6-7
6.7 Verifying Upgrade Results 6-8

Chapter 7. Configuring Typical Applications

7.1 Ethernet Private Line Application 7-1
Configuring Management Connectivity 7-2
Configuring Classifier Profiles 7-2
Configuring Flows 7-3

Appendix A. Connection Data

Appendix B. Operation, Administration, and Maintenance (OAM)

Chapter 1
Introduction

1.1 Overview

ETX-204A is a carrier Ethernet demarcation device owned and operated by the service provider and installed at the customer premises, delivering SLA-based Ethernet business services to the customer premises over native Ethernet access. In addition, it functions as a mobile demarcation device (MDD), efficiently managing mobile broadband traffic between the IP NodeB/ LTE eNodeB and the network core with SLA assurance.

Furthermore, incorporating RAD's SyncToP platform of synchronization and timing over packet feature set, ETX-204A utilizes standard technologies such as 1588v2 and Synchronous Ethernet to ensure highly accurate traffic delivery in packet-based mobile backhaul networks.

The device delivers Ethernet E-line services (EPL and EVPL) and is MEF 9 and MEF 14 certified.

Incoming customer traffic is classified and mapped according to port-based (all-in-one) bundling or by user port and CE VLAN-ID, VLAN priority, DSCP, IP precedence, MAC, IP address, and Ethertype. This offers operators the flexibility to differentiate services using different kinds of classification methods, police the traffic, and enforce SLA per service.

ETX-204A supports powerful bandwidth profiles such as CIR/CBS and EIR/EBS for differentiated Ethernet services and includes comprehensive Ethernet OAM (Operation, Administration, and Maintenance) functionality together with SLA monitoring.

Two Ethernet network ports as well as up to four Ethernet subscriber ports use SFP/UTP combo ports that can operate as fiber optic SFP-based interfaces or electrical RJ-45 interfaces.

The SFP/UTP combo ports are FE/GbE auto detecting and can accommodate a wide range of Fast Ethernet and Gigabit Ethernet SFP transceivers, allowing service providers to seamlessly connect customers located at different distances from the device.

The network ports support 1:1 or LAG link aggregation. At the physical layer, ETX-204A supports autonegotiation and fault propagation.

The unit can be managed via a local terminal port, via a dedicated out-of-band Ethernet port, or via a user or network port.

Device Options

Several versions of the unit are available, offering different combinations of Ethernet ports and enclosures.

- **Network ports** – Up to two SFP/UTP combo ports that can act as SFP-based fiber optic or 10/100/1000BaseT electrical. Port 2 can be configured as a network or user port.
- **User ports** – Up to four SFP/UTP combo ports that can act as SFP-based fiber optic or 10/100/1000BaseT electrical, or up to five if port 2 is configured as a user port.

The network/user SFP ports are FE/GbE auto detecting.

- **Enclosure** –Metal, 8.4" or 17.4". For the allowed storage and operating temperature range, refer to *Technical Specifications*.

Note *The SFP/UTP combo ports operate in SFP-preferred mode. If an SFP is inserted then the interface functions as an SFP-based fiber optic interface, otherwise it functions as an electrical RJ-45 interface.*

Applications

ETX-204A delivers Ethernet services as defined by the MEF standards, as well as cellular backhauling.

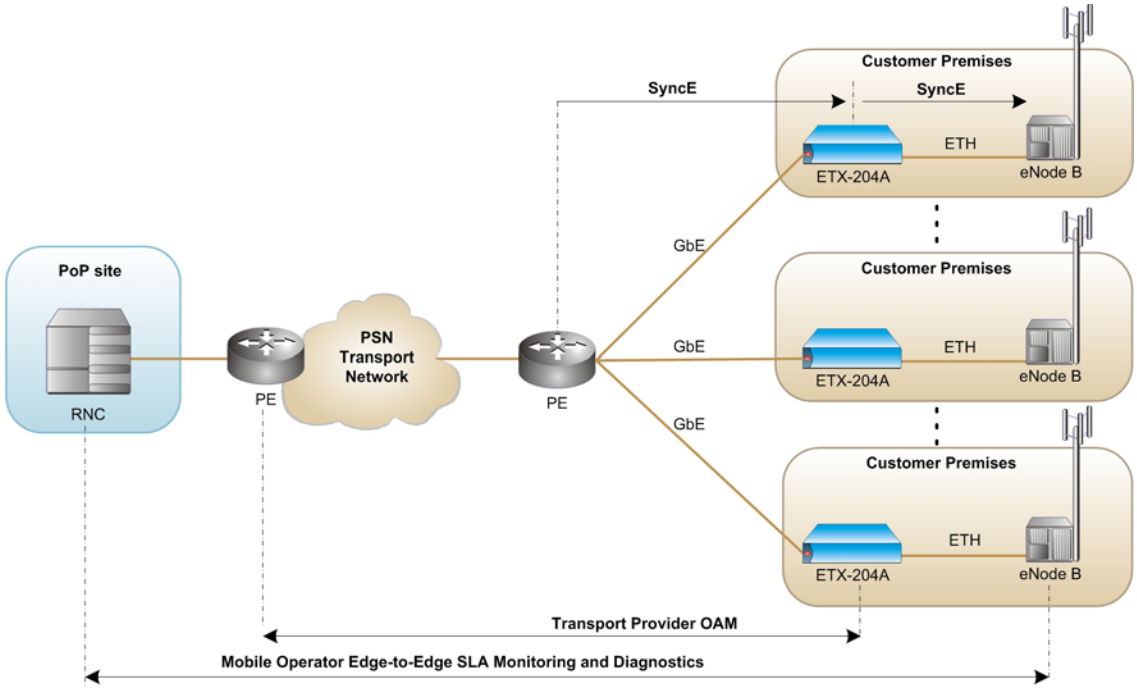


Figure 1-1. E-Node B/LTE Backhauling

Figure 1-2. EPL Service

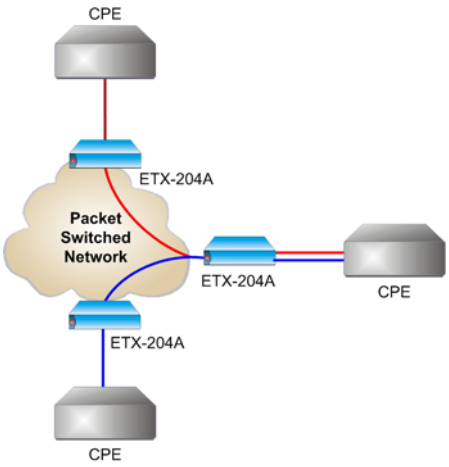


Figure 1-3. EVPL Service

Features

Service Types

ETX-204A provides port- and flow-based services.

Port-Based Service

In a typical port-based (all-to-one bundling) application ETX-204A receives different services via different user ports (*Figure 1-4*). This method achieves clearer service separation, it does not require any marking for CoS, and provides straightforward SLA measurement.

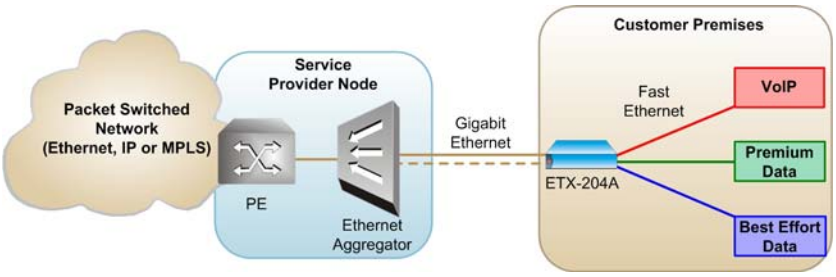


Figure 1-4. Port-Based Service

Flow-Based Service

In a typical flow-based application different services are assigned to different Ethernet flows received by the same user port (*Figure 1-5*). This provides a cheaper, more scalable solution, with a possibility of mixing different service types.

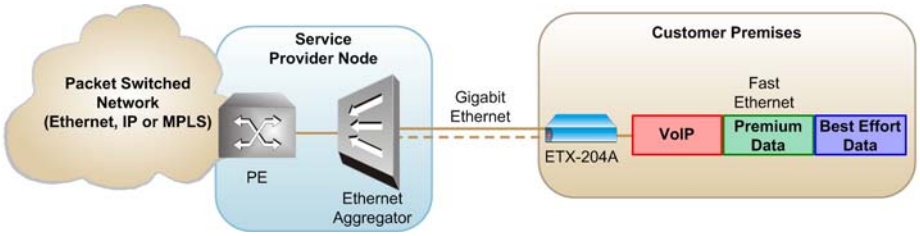


Figure 1-5. Flow-Based Service

Service Level Agreement (SLA) Monitoring

ETX-204A is an effective tool for measuring the Service Level Agreement parameters, such as Frame Delay, Frame Delay Variance (jitter), Frame Loss and Availability.

Flow Classification

The ingress user traffic is mapped to the Ethernet flows using the following list of per-port classification criteria. In the classifications, VLAN refers to the service provider (outer) VLAN, previously referred to as SP-VLAN, while inner VLAN refers to the Customer Entity VLAN, previously referred to as CE-VLAN.

- Port-based (All to one bundling)

- VLAN
- VLAN + VLAN priority
- VLAN + IP precedence
- VLAN + DSCP
- VLAN + source/destination MAC
- VLAN + source/destination IP address
- VLAN + inner VLAN
- VLAN + VLAN priority + inner VLAN
- VLAN + non-IP
- VLAN + Ethertype
- VLAN priority
- IP precedence
- DSCP
- Source/destination MAC
- Source/destination IP address
- Non-IP
- Ether Type
- Untagged.

ETX-204A supports up to 270 Ethernet flows. Flows are unidirectional.

Tagging and Marking

ETX-204A supports several options for marking and tagging.

You can perform the following marking actions:

- Overwrite inner or outer VLAN with a new value
- Overwrite inner or outer VLAN p-bit with a new value.

You can perform the following tagging actions:

- Add (push) outer VLAN, with p-bit value that can be copied from the original value or set to a new value. When you add a new VLAN, the original outer VLAN becomes the inner VLAN.
- Remove (pop) outer VLAN and p-bit. When you remove a VLAN, the inner VLAN becomes the outer VLAN.
- Add (push) inner VLAN, with p-bit value that can be copied from the original value or set to a new value
- Remove (pop) inner VLAN and p-bit.

Only certain combinations of actions on the outer and inner VLAN are allowed. Refer to *Chapter 4* for details on the permitted combinations of actions.

Quality of Service (QoS)

Different service types require different levels of QoS to be provided end-to-end. QoS can be defined per subscriber as well as per flow. QoS has three aspects: rate limitation, traffic shaping, and traffic prioritization.

A single policer can be applied per flow, or a policer aggregate can be applied to a group of up to five flows. The policers operate according to the dual token bucket mechanism (CIR+CBS, EIR+EBS). A special mechanism compensates for Layer 1 headers. Traffic can be limited to the line rate or the data rate.

In addition, ETX-204A features unique p-bit re-marking capabilities that assign color-specific p-bit values to Ethernet frames at network ingress to ensure metering continuity across the Metro Ethernet network. User traffic that was marked "Yellow" according to the CIR/EIR parameters by the device QoS engine is assigned a new p-bit value to signal its status and priority, so that it is dropped first by 802.1Q and 802.1ad network elements in the event of congestion. This is especially useful in color-blind as well as color-aware networks with no "discard eligible" ("yellow") marking.

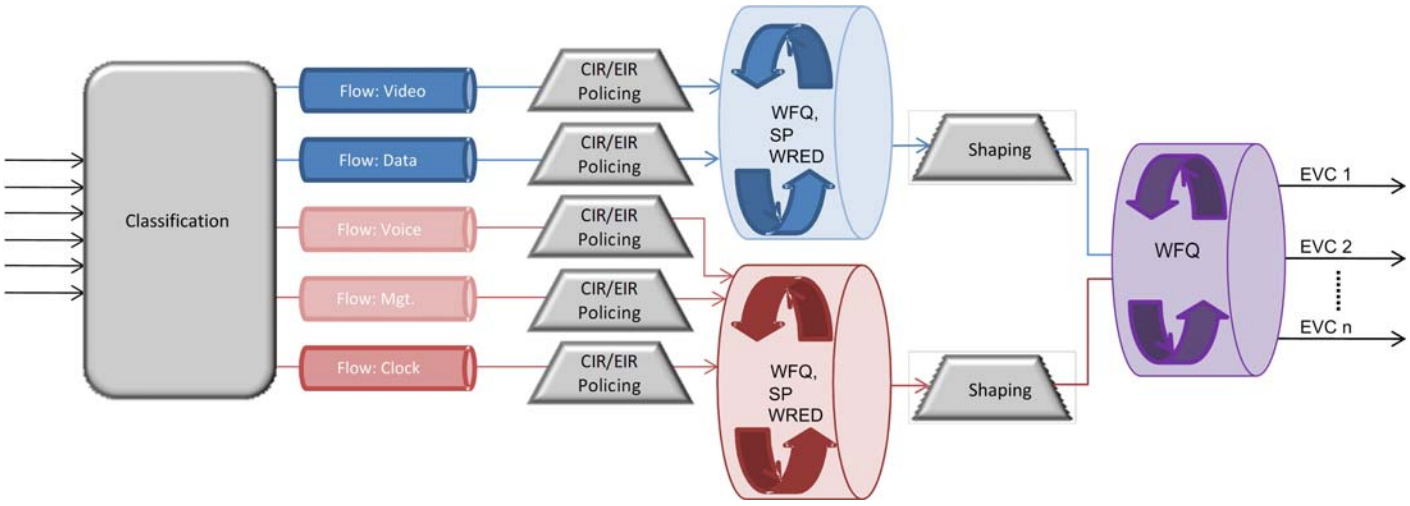


Figure 1-6. Policing and Hierarchical Scheduling/Shaping

Traffic Prioritization

Once traffic is classified to a flow, it can be mapped to Strict (Strict Priority) queues or WFQ (Weighted Fair Queues):

- **Strict**. The data flow set to the highest priority is transmitted first. If this data flow stops, all tasks at lower priorities move up by one priority level. For example, the data flow set to the second-highest priority is then transmitted at the highest priority.
- **WFQ**. Allows different scheduling priorities to statistically multiplex data flows with different shares on the service. Each data flow has a separate FIFO queue. A link transmitting at a data rate ***R***, all non-empty data flows ***N*** are served simultaneously according to the assigned share ***w***, each at an average rate of $R/(w_1 + w_2 + w_3 + \ldots + w_N)$. If one data flow stops, the remaining data flows each receive a larger share ***w***.

The WRED mechanism ensures that queues are not congested and high-priority traffic is maintained. Each queue is assigned a WRED profile for which you can configure the thresholds and probability to suit your needs.

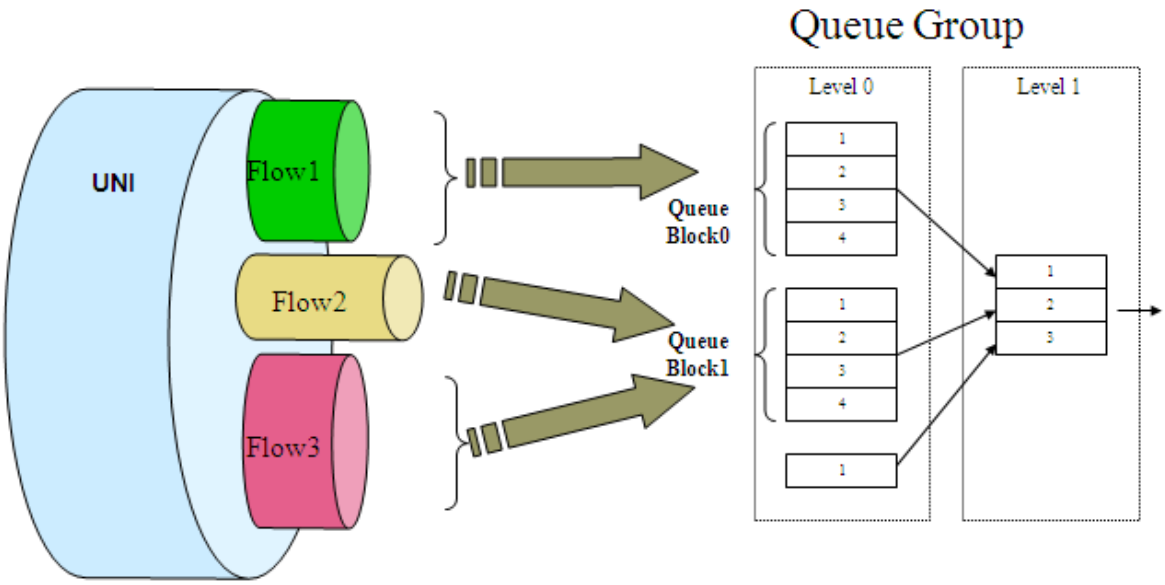


Figure 1-7. Queue Structure

Level 0 contains up to 30 queue blocks. Each block has eight queues and its own scheduling (Strict and WFQ). For each queue block in level 0, there is a queue in level 1 that represents the scheduling between the queue blocks in level 0. Flows can be bound to each queue block in level 0.

Queue Mapping and Marking

The queue mapping functionality associates the user priorities with queue numbers (CoS).

The marking functionality maps the user priority to the SP priority, according to p-bit/DSCP/IP precedence. The marking can also be done according to color (green and/or yellow) in addition to user priority.

The queue mapping and marking functionality is bound to each flow. For every port, a queue mapping can be done for one type of user priority classification.

Hierarchical Scheduling and Shaping Per Flow

Every flow has its own queues and scheduler. ETX-204A supports up to 30 queue blocks per queue group. There are 30 available queues for the network ports and eight available queues for the user ports. Flows that are in the direction user port to network port can be bound to one of 30 queues, and flows that are in the direction network port to user port can be bound to one of eight queues.

Handling the Traffic Flow

Table 1-1 provides an overview of the traffic handling stages. Refer also to *Figure 1-6* for an overview of policing and hierarchical scheduling/shaping.

Table 1-1. Traffic Handling Stages

Processing Stage	Description
Classification	Classifying traffic such as email traffic, content streaming, large document transmission, etc.
Policer per Flow or Group of Flows	Policing the traffic within the flow or group of flows
CoS/Services	Dividing the services using a 3-bit field, specifying a priority value between 0 (signifying best-effort) and 7 (signifying priority real-time data)
Queues	'Storing' data that is transmitted according to the CoS level specified
Rate Limitation/ Shaping	Ensuring that traffic is shaped to the desired rate
Scheduling	Scheduling and 'regulating' traffic
Editing and Marking	Adding or removing VLAN IDs, as well as marking the priority on the outer VLAN header

Ethernet OAM

ETX-204A provides OAM to monitor and troubleshoot an Ethernet network and quickly detect failures. Two OAM types are provided:

- CFM OAM (End-to-end OAM) based on IEEE 802.1ag-D8 and Y.1731 for continuity check, non-intrusive loopback, and performance management.
- EFM OAM (Link OAM) according to IEEE 802.3-2005 (formerly IEEE 802.3ah) for remote management and fault indication, including remote loopback, dying gasp, and MIB parameter retrieval.

Jumbo Frames and Egress MTU

ETX-204A supports large frames of up to 12 Kbytes. The egress MTU can be defined per port.

Link Redundancy

The unit features network link redundancy in a LAG architecture that supports the LACP protocol according to 802.3-2005. Dual homing technology in a 1:1 architecture allows ETX-204A to be connected to two different upstream devices. Link redundancy is available if two ports are configured as network ports.

L2CP Handling

ETX-204A can be configured to pass through Layer-2 control frames (including other vendors' L2CP frames) across the network, to peer-supported protocols (IEEE 802.3-2005), or to discard L2CP frames.

Fault Propagation

The unit provides the following types of fault propagation:

- Network-to-user fault propagation mechanism on the port and OAM CFM levels – When fault propagation is enabled, the user port shuts itself down or an OAM CFM indication of failure is sent when a link failure is detected at the network port or when an OAM CFM indication of failure is received.
- User-to-network fault propagation mechanism on the port and OAM CFM levels – When fault propagation is enabled, the network port shuts itself down or an OAM CFM indication of failure is sent when a link failure is detected at the user port or an OAM CFM indication of failure is received.

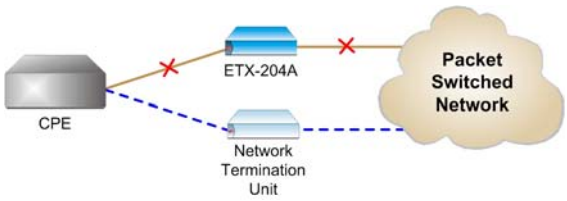


Figure 1-8. Fault Propagation

Management

ETX-204A can be managed as follows:

- Local management via ASCII terminal connected to the V.24/RS-232 DCE control port.
- Local management via dedicated out of band (OOB) management port.
- Remote management via a network or user port using Telnet SSH or RADview, RAD's SNMP-based management system. ETX-204A supports the SNMP version 3 entity, providing secure access to the device by authenticating and encrypting packets transmitted over the network.

Management can be performed by creating a flow to/from the host port, thus enabling QoS on the management traffic. Management can be configured to use untagged or tagged frames.

Command Line Interface

You can create data bases and scripts of commonly used commands and easily apply them to multiple units in your infrastructure using RAD's new command line interface.

Security

To ensure client-server communication privacy and correct user authentication, ETX-204A supports the security protocols listed below:

- SNMPv3
- RADIUS (client authentication only)
- SSH for Secure Shell communication session.

Syslog

The syslog protocol is a client/server-type protocol, featuring a standard for forwarding log messages in an IP network and supports up to four syslog servers at present. A syslog sender sends a small text message of less than 1024 bytes to the syslog receiver. Syslog messages are sent via UDP in cleartext.

DHCP Client

When enabled, the DHCP client of ETX-204A requests an IP address, IP mask, and default gateway from the DHCP server.

SFTP

SFTP (Secure File Transfer Protocol) is supported, to provide secure encrypted file transfer using SSH.

Statistics Collection

ETX-204A collects performance statistics for the physical layers of the network/user ports, Ethernet flows, OAM CFM, and Radius.

In addition, ETX-204A provides Rmon Statistics based on RFC 2819. In this scenario, ETX-204A can send reports when one of the defined counters rises above or drops below specified thresholds within the sampling period of time. These reports can be sent as SNMP traps to defined network management stations and/or written to the event log.

Synchronous Ethernet Timing

The unit's SyncToP™ suite includes clock recovery using IEEE 1588v2 Precision Timing Protocol, Synchronous Ethernet (Sync-E), and a built-in input/output clock interface. The device can use Sync-E to receive the clock from the network, or can transparently forward via 1588v2 with accurate timestamps.

ETX-204A supports up to two clock sources, which can be the user/network Ethernet ports or the station clock. The timing subsystem automatically selects the best timing source to use for synchronization. The Ethernet ports can transmit SSM messages and distribute (in downstream direction) the quality of the currently selected clock.

Network Time Protocol

The Network Time Protocol (NTP) provides the means of synchronizing all managed elements across the network to a reliable clock source provided by multiple servers. ETX-204A supports the client side of the NTP v.3 (RFC 1305).

Diagnostic Tools

ETX-204A offers several types of diagnostic procedures:

- Ping test –Check IP connectivity by pinging remote IP hosts.

- Trace route –Quickly trace a route from ETX-204A to any other network device
- Loopback tests:
  - Layer-1 loopback performed at the PHY of the physical ports. When the loopback is active the data forwarded to a port is looped from the Tx path to the Rx path, disrupting the traffic. This loopback cannot pass through Ethernet bridges.
  - Layer-2/Layer-3 loopback on flows with optional MAC and/or IP address swapping. When the loopback is active, ETX-204A can exchange the source and destination MAC/IP addresses of the incoming packets. This loopback passes through Ethernet bridges and routers, and does not disrupt traffic flows that are not being tested.

1.2 What's New in This Version

The following features have been added for Version 2.2:

- Full support for SyncE clock transfer per G.8262 including clock selection mechanism
- 1588v2 end-to-end transparent clock support between all ETH ports
- Color re-marking to change the VLAN priority according to the SLA commitment (packet color)
- Dying gasp for AC/DC power supply – Unit sends IEEE 802.3-2005 dying gasp message and trap when power fails
- RMON support per port (RFC 2819): etherStatsTable and alarm group are supported
- Inband management bridging allows management through user port, Reducing need for separate management port
- Bidirectional fault propagation based on CFM OAM messages
- OAM-EFM (IEEE 802.3-2005) active mode – Power failure at a remote unit is propagated to the management system via the nearest ETX-204A
- Ethernet OAM loopback per IEEE 802.3-2005 on a single segment (point-to-point)
- Temperature monitoring:
  - The temperature of the unit can be displayed
  - Temperature threshold can be configured
  - Abnormal device temperature is reported.
- Double VLAN mapping (CE-VLAN + SP-VLAN) allowed for management flows and flows user -› network
- Commands added: **`clear-statistics`**, **`show version`**
- OAM CFM dynamic package (higher limits on number of allowed MDs and MAs, dynamic MEP allocation, destination NEs)
- Port being tested indicated by operational status displayed by **`show summary`**
- SNTP multiple servers
- Temperature-hardened version available in 8.4″ in addition to 17.4″ unit
- Trap masking available for all traps
- Trap synchronization
- WRED profiles
- Option for 24V DC power supply.

1.3 Physical Description

Figure 1-9 shows a 3D view of an 8.4-inch ETX-204A unit and a 17.4-inch ETX-204A unit.

The front panels include network and user Ethernet ports. The 17.4-inch enclosure includes a dual power supply at the front panel as well. On 8.4-inch units, a single power supply is located on the rear panel. The ETX-204A interface connections are described in greater detail in *Chapter 2*.

Figure 1-9. 3D View of ETX-204A

1.4 Technical Specifications

Network Interface	*Number of Ports*	Up to 2 SFP/UTP combo ports. The second port can be configured as a network or user port.
	Type	Fast or Gigabit Ethernet
	Fiber Optic Specifications and Ranges	See SFP Transceivers data sheet
	Electrical Operation Mode	10/100/1000 Mbps, full duplex, autonegotiation, MDI/MDIX
User Interface	*Number of Ports*	Up to 4 SFP/UTP combo ports. If the second network port is configured as a user port, there are five user ports.
	Type	Fast or Gigabit Ethernet
	Fiber Optic Specifications and Ranges	See SFP Transceivers data sheet
	Electrical Operation Mode	10/100/1000 Mbps Full duplex, autonegotiation, MDI/MDIX
Station Clock	*Bit Rate*	2.048 MHz/2.048 Mbps (E1)
	Line Code	AMI/HDB3
	Nominal Impedance	120Ω balanced 75Ω unbalanced (via adapter cable)
	Connector	RJ-45 shielded
Standards Compliance	*IEEE*	802.3, 802.3u, 802.1d, 802.1q, 802.1p, 802.3-2005 (relevant parts), 802.3-2005, 802.1ag-D8
	MEF	MEF 6 (E-Line – EPL and EVPL), MEF 9, MEF 10, MEF 14
	ITU-T	G.8262, Y.1731
Ethernet Flows	*Number of Flows*	270
Management	*Local*	Via dedicated terminal port; V.24/RS-232 DCE; 9.6, 19.2, 38.4, 57.6, 115.2 kbps; DB-9 female connector

	Inband	Via one of the Ethernet ports
	Out-of-band	Via dedicated management port
Indicators	*PWR (green)*	Power status
	TST/ALM (red)	Alarm and loopback status
	NET 1, NET 2, USER 3–6 (green)	Link/activity status of the network/user port
	Station clock port (green)	Clock port status
Power	*AC*	100–240 VAC, 50/60 Hz, single power supply
	DC	48V (-48 to 72 VDC), single power supply
	24DC	24V (20 to 32VDC), single power supply
	ACR	100–240 VAC, 50/60 Hz, dual power supply
	DCR	48V (-48 to 72 VDC), dual power supply
	24DCR	24V (20 to 32VDC), dual power supply
	Power Consumption	15W
Physical	*Height*	43.7 mm (1.7 in)
	Width	215 mm (8.4 in)
	Depth	300 mm (11.8 in)
	Weight	2.4 kg (5.2 lb)
Physical (ETX-204A/H)	*Height*	43.7 mm (1.7 in)
	Width	440 mm (17.4 in)
	Depth	240 mm (9.5 in)
	Weight	3.1 kg (6.8 lb)
Environment	*Temperature*	ETX-204A: 0°C to 50°C (32°C to 122°F) ETX-204A/H: -20 to 65°C (-4 to 149°F)
	Humidity	Up to 90%, non-condensing

Chapter 2

Installation and Setup

This chapter describes installation and setup procedures for the ETX-204A unit.

After installing the unit, refer to *Chapter 3* for the operating instructions.

If a problem is encountered, refer to *Chapter 5* for test and diagnostic instructions.

Warning

Internal settings, adjustment, maintenance, and repairs may be performed only by a skilled technician who is aware of the hazards involved.

Always observe standard safety precautions during installation, operation, and maintenance of this product.

2.1 Site Requirements and Prerequisites

The ETX-204A device is intended for installation on desktop, 19″ racks, and walls. The following mounting kits are available from RAD:

- RM-35 for mounting one or two regular ETX-204A units in a 19″ rack
- RM-34 for mounting one temperature-hardened ETX-204A unit in a 19″ rack
- WM-35 for mounting one regular ETX-204A unit on a wall
- WM-34 for mounting one temperature-hardened ETX-204A unit on a wall.

AC-powered units should be installed within 1.5 m (5 ft) of an easily-accessible grounded AC outlet capable of furnishing the voltage in accordance with the nominal supply voltage.

DC-powered units require a -48 VDC power source, which must be adequately isolated from the main supply.

Note

Refer also to the sections describing connections of AC and DC mains at the beginning of the manual.

Allow at least 90 cm (36 in) of frontal clearance for operating and maintenance accessibility. Allow at least 10 cm (4 in) clearance at the rear of the unit for signal lines and interface cables.

The ambient operating temperature of ETX-204A is 0 to 50°C (32 to 122°F) and the ambient temperature range of ETX-204A/H is -40 to 65°C (-40 to 149°F), both at a relative humidity of up to 90%, non-condensing.

2.2 Package Contents

The ETX-204A package includes the following items:

- One ETX-204A unit
- Matching SFP module(s) (if ordered)
- AC power cord or DC connection kit
- Optional accessories included if ordered:
  - CBL-DB9F-DB9M-STR, control port cable
  - RM-35 rack-mount kit for regular ETX-204A unit or RM-34 rack-mount kit for temperature-hardened ETX-204A unit (if ordered)
  - WM-35 wall-mount kit for regular ETX-204A unit or WM-34 wall-mount kit for temperature-hardened ETX-204A unit (if ordered).

2.3 Mounting the Unit

ETX-204A is designed for installation as a desktop unit. It can also be mounted in a 19" rack or on a wall.

- For rack mounting instructions, refer to the associated installation kit manual.
- For wall mounting instructions, refer to the associated installation kit manual.
- If ETX-204A is to be used as a desktop unit, place and secure the unit on a stable, non-movable surface.

Refer to the clearance and temperature requirements in *Site Requirements and Prerequisites*.

2.4 Installing SFP Modules

ETX-204A uses SFP modules with LC fiber optic connectors. The unit has SFP/UTP combo ports that operate as fiber optic SFP-based interfaces when SFPs are inserted.

Warning

Third-party SFP optical transceivers must be agency-approved, complying with the local laser safety regulations for Class I laser equipment.

➤ **To install the SFP modules:**

- Lock the wire latch of each SFP module by lifting it up until it clicks into place, as illustrated in *Figure 2-1*.

Note

Some SFP models have a plastic door instead of a wire latch.

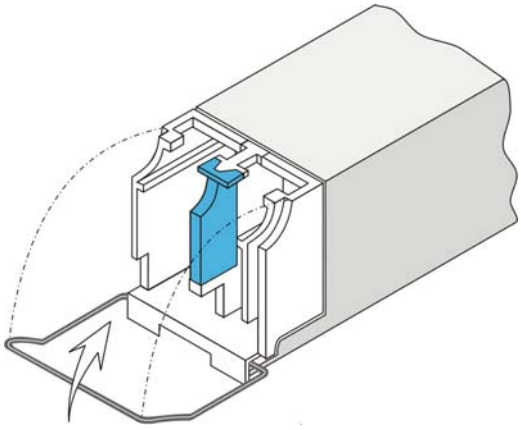


Figure 2-1. Locking the SFP Wire Latch

1. Carefully remove the dust covers from the SFP slot.
2. Insert the rear end of SFP into the socket, and push slowly backwards to mate the connectors until the SFP clicks into place. If you feel resistance before the connectors are fully mated, retract the SFP using the wire latch as a pulling handle, and then repeat the procedure.
3. Remove the protective rubber caps from the SFP modules.

➤ **To remove the SFP module:**

1. Disconnect the fiber optic cables from the SFP module.
2. Unlock the wire latch by lowering it downwards (as opposed to locking).
3. Hold the wire latch and pull the SFP module out of the Ethernet port.

Caution Do not remove the SFP while the fiber optic cables are still connected, as this may result in mechanical and/or functional damage. For example the SFP module clip on the module and in the socket may be chipped (mechanical issue) or the redundancy network port switching process may not be properly completed (functional issue).

2.5 Connecting to Ethernet Equipment

ETX-204A is connected to the Ethernet equipment via the SFP portion of the combo port designated GbE or the UTP portion designated 10/100/1000BT according to the relevant hardware configuration. Refer to *Appendix A* for the RJ-45 connector pinout. The instructions below are illustrated using a sample configuration with a regular (8.4") ETX-204A enclosure.

➤ **To connect to the Ethernet equipment with fiber optic interface:**

- Connect ETX-204A to the Ethernet equipment using a standard fiber optic cable terminated with an LC connector.

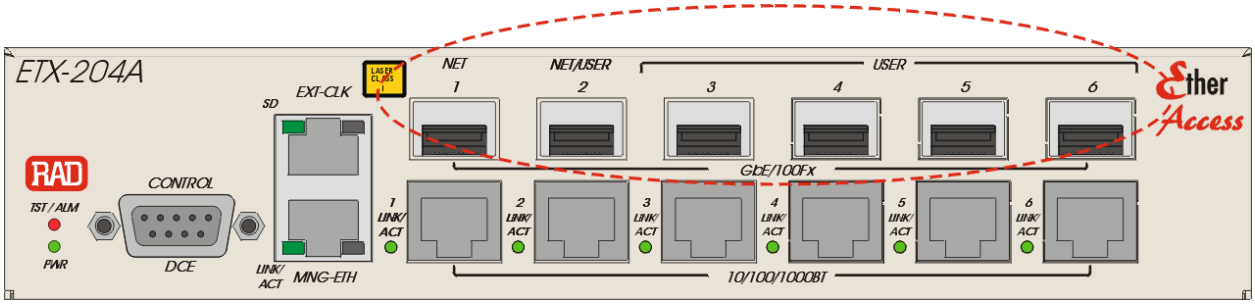


Figure 2-2. GbE Fiber Optic Connectors

➤ **To connect to the Ethernet equipment with a copper interface:**

- Connect ETX-204A to the Ethernet network equipment using a standard straight UTP cable terminated with an RJ-45 connector.

Note

In order to comply with electromagnetic compatibility requirements, it is recommended to use shielded cables when connecting to the RJ-45 port of the ETX-204A electrical network or user interface.

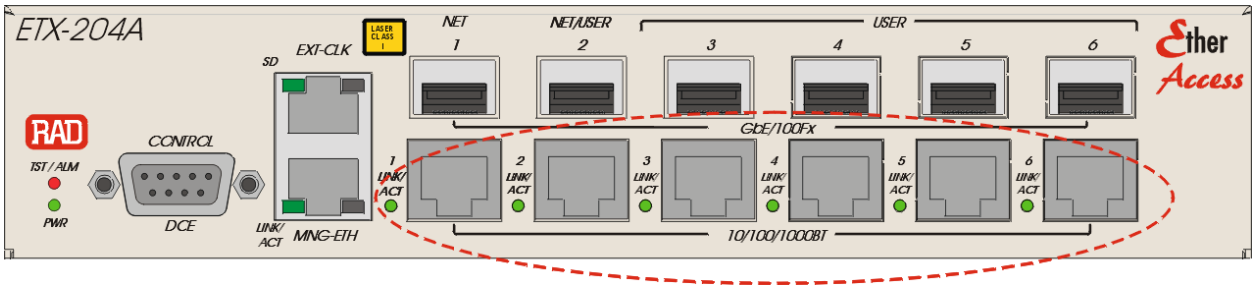


Figure 2-3. 10/10/1000BT Electrical Connectors

2.6 Connecting to External Clock Source

ETX-204A is connected to an external clock source via a dedicated station clock port, an RJ-45 connector designated EXT-CLK. The station clock port can be connected to a balanced or unbalanced clock source. Refer to *Appendix A* for the connector pinout.

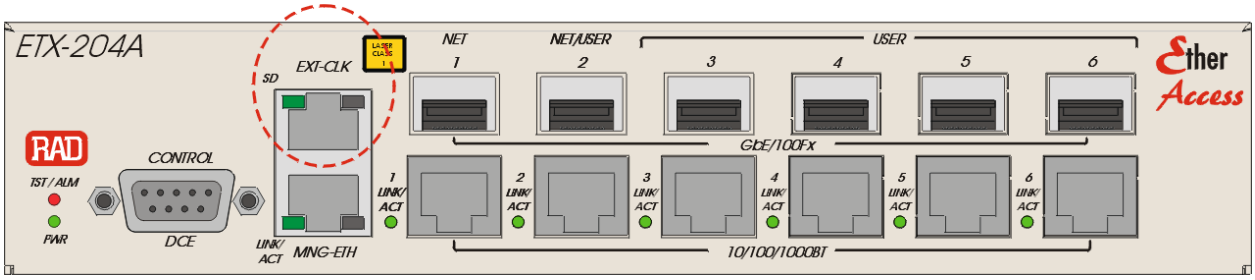


Figure 2-4. EXT-CLK Connector

Connecting to a Balanced Clock Source

➤ **To connect ETX-204A to a balanced clock source:**

- Connect the station clock port to the clock source using a shielded standard UTP cable terminated with an RJ-45 connector.

Connecting to an Unbalanced Clock Source

To connect to equipment with an unbalanced interface, it is necessary to convert the RJ-45 connector to a pair of BNC female connectors, in order to receive the clock signal via one of the connectors and transmit the signal via the other.

RAD offers a suitable adapter cable, CBL-RJ45/2BNC/E1/X, with an RJ-45 connector at one end and two BNC female connectors at the other end. For this particular cable, the receiving BNC connector is green and the transmitting BNC connector is red.

➤ **To connect ETX-204A to an unbalanced clock source:**

1. Connect the RJ-45 connector of the adapter cable to the station clock port.
2. Connect the external clock source to the receiving BNC connector of the adapter cable.
3. Connect the transmitting BNC connector of the adapter cable to the equipment that should receive the clock signal.

2.7 Connecting to ASCII Terminal

ETX-204A is connected to an ASCII terminal via a 9-pin D-type female connector designated CONTROL. Refer to *Appendix A* for the connector pinout.

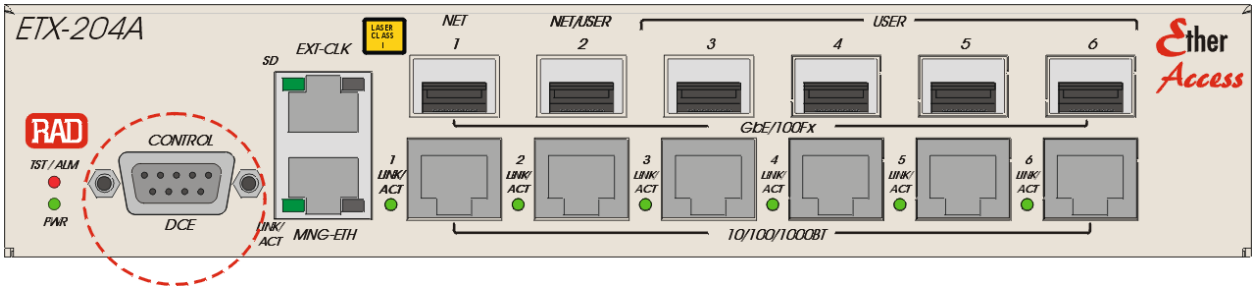


Figure 2-5. CONTROL Connector

➤ **To connect to an ASCII terminal:**

1. Connect the male 9-pin D-type connector of CBL-DB9F-DB9M-STR straight cable available from RAD to the CONTROL connector.
2. Connect the other end of the CBL-DB9F-DB9M-STR cable to an ASCII terminal.

Caution Terminal cables must have a frame ground connection. Use ungrounded cables when connecting a supervisory terminal to a DC-powered unit with floating

ground. Using improper terminal cable may result in damage to the supervisory terminal port.

2.8 Connecting to Management Port

ETX-204A is connected to remote network management stations via the dedicated Ethernet management port, an 8-pin RJ-45 connector designated MNG-ETH. Refer to *Appendix A* for the connector pinout.

➤ **To connect to an NMS:**

- Connect ETX-204A to an Ethernet switch.

Note

In order to provide protection against surges, use shielded cables when connecting to the MNG-ETH port.

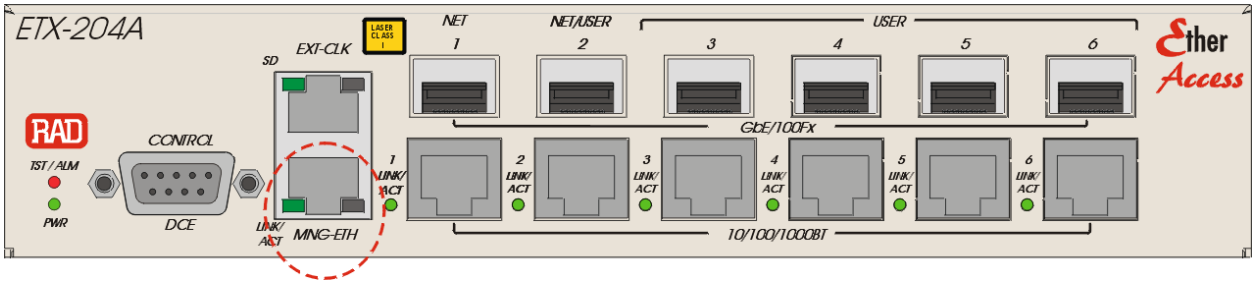


Figure 2-6: Ethernet Management Connector

2.9 Connecting to Power

Regular units are available with AC or DC power supply. For the exact specs, refer to *Technical Specifications* in Chapter 1.

Warning

Before connecting or disconnecting any cable, the protective ground terminals of this unit must be connected to the protective ground conductor of the mains (AC or DC) power cord. If you are using an extension cord (power cable) make sure it is grounded as well.

Any interruption of the protective (grounding) conductor (inside or outside the instrument) or disconnecting of the protective ground terminal can make this unit dangerous. Intentional interruption is prohibited.

Note *Refer also to the sections describing connections of AC and DC power at the beginning of the manual.*

Connecting to AC Power

AC power should be supplied via a 1.5 m (5 ft) standard power cable terminated by a standard 3-prong socket. A cable is provided with the unit.

➤ **To connect AC power:**

3. Connect the power cable to the power connector on the ETX-204A rear panel.
4. Connect the power cable to the mains outlet.

   The unit turns on automatically once connected to the mains.

Connecting to DC Power

Terminal block connectors with adapters are available for DC power supplies.

➤ **To connect DC power:**

- Refer to the Terminal Block Connector DC Power Supply Connection supplement for instructions on wiring the DC adapters. This supplement can be found at the end of this manual.

Note *The power connectors of regular units are located at the rear while the power connectors of temperature-hardened units are located at the front.*

Chapter 3

Operation

This chapter:

- Explains power-on and power-off procedures
- Provides a detailed description of the front panel controls and indicators and their functions
- Lists alternative methods of the product configuration, explaining the ASCII terminal management application and CLI (Command Line Interface).

For a detailed explanation of parameters, see *Chapter 4*.

3.1 Turning On the Unit

➤ To turn on ETX-204A:

- Connect the power cord to the mains.

  The PWR indicator lights up and remains lit as long as ETX-204A receives power.

ETX-204A requires no operator attention once installed, with the exception of occasional monitoring of front panel indicators. Intervention is only required when ETX-204A must be configured to its operational requirements, or diagnostic tests are performed.

3.2 Indicators

The unit's LEDs are located on the front panel (see *Figure 3-1*). *Table 3-1* lists the functions of the ETX-204A LED indicators.

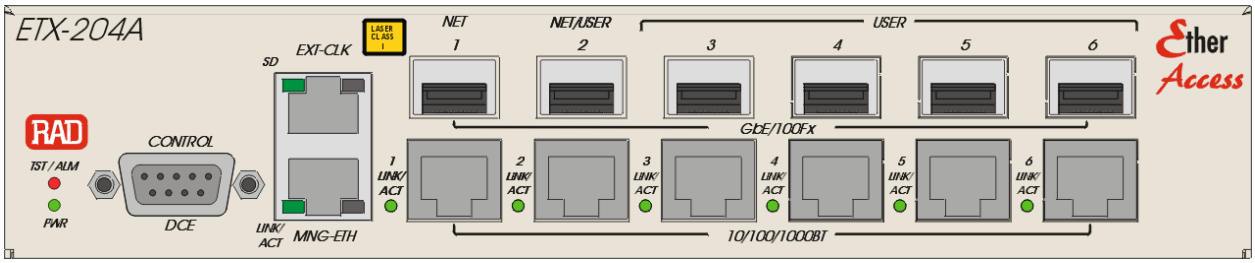


Figure 3-1. Front Panel

Table 3-1. LEDs and Controls

Name	Type	Function
PWR	Green LED	ON – Power is ON
TST/ALM	Red LED	ON – One of the Ethernet links is down Blinking – Diagnostic loopback is active
LINK/ACT 1, 2, 3, 4, 5, 6	Green LEDs	ON – Corresponding Ethernet link is OK Blinking – Data is being transmitted or received on the corresponding Ethernet link
LINK/ACT EXT-CLK	Green LEDs	ON – Station clock port is connected
LINK/ACT MNG-ETH	Green LEDs	ON – Management Ethernet link is OK Blinking – Data is being transmitted or received on the management Ethernet link

Note

The number of network ports and user ports and the corresponding number of LEDs depend on the hardware configuration.

3.3 Configuration and Management Alternatives

Once installed, there are no special operating procedures for ETX-204A. The unit operates automatically after it has started up. The unit's operational status can be constantly monitored.

ETX-204A can be managed via the following ports and applications:

- Local management via an ASCII terminal connected to the RS-232 port. Usually, preliminary configuration of the system parameters is performed via ASCII terminal. Once the ETX-204A host IP parameters are set, you can access it via Telnet SSH or SNMP for further configuration.
- Remote inband management via user or network port or out-of-band via the dedicated management port. Remote management is via Telnet or SNMP.

Alternatively, you can manage ETX-204A via a third-party SNMP-based NMS. Refer to *Chapter 5* for a trap list.

The following functions are supported by the ETX-204A management software:

- Viewing system information
- Modifying configuration and mode of operation, including setting system default values and resetting the unit
- Monitoring ETX-204A performance
- Initiating connectivity tests
- Uploading and downloading software and configuration files.

Working with Terminal

ETX-204A has a V.24/RS-232 asynchronous DCE port, designated CONTROL and terminated in a 9-pin D-type female connector. The control port continuously monitors the incoming data stream and immediately responds to any input string received through this port.

➤ **To start a terminal control session:**

1. Make sure all ETX-204A cables and connectors are properly connected.
2. Connect ETX-204A to a PC equipped with an ASCII terminal emulation application (for example, HyperTerminal). Refer to *Chapter 2* for details on connecting to the control port.
3. Start the PC terminal emulation (in Windows XP: Select **Start > All Programs > Accessories > Communications> HyperTerminal** to create a new terminal connection).

   The HyperTerminal application opens, and the Connection Description dialog box is displayed.

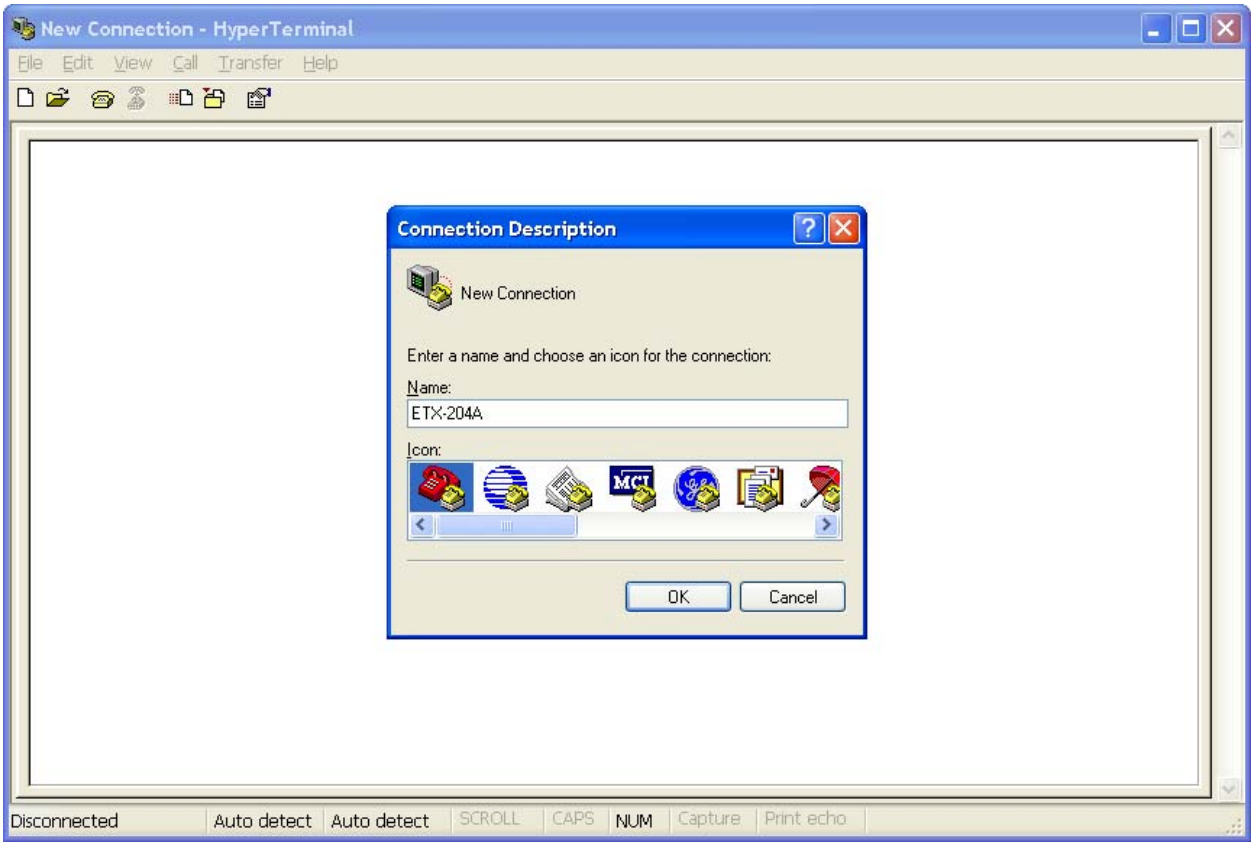


Figure 3-2. HyperTerminal with Connection Description Dialog Box

4. Enter a name for the connection.
5. Select an icon to represent the terminal connection, or leave the default icon selected.
6. Click <**OK**>.

   The Connect To dialog box is displayed.

Figure 3-3. Connect To Dialog Box

7. Select a PC COM port to be used to communicate with ETX-204A, and click ‹OK›.

   The COM Properties dialog box is displayed.

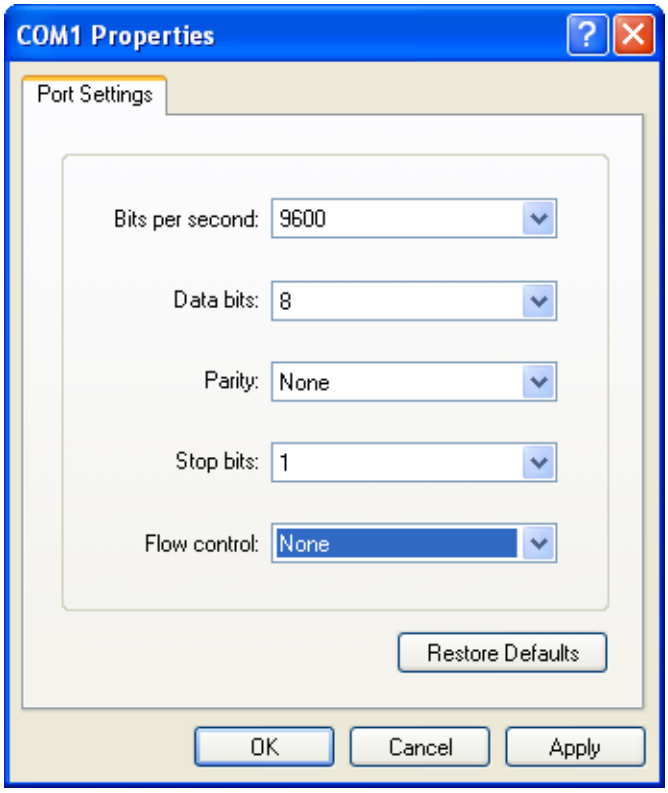


Figure 3-4. COM1 Properties Dialog Box

8. Configure the communication port parameters as follows:
   - Bits per second: 9,600
   - Data bits: 8
   - Parity: None
   - Stop bits: 1
   - Flow control: None.
9. Click ‹OK› to close the COM Properties dialog box.

   HyperTerminal is now ready for communication with the unit.

Note *It is not necessary to set the emulation type.*

10. Power-up ETX-204A.

    ETX-204A boots up. When the startup process is completed, you are prompted to press ‹ENTER› to receive the login prompt.

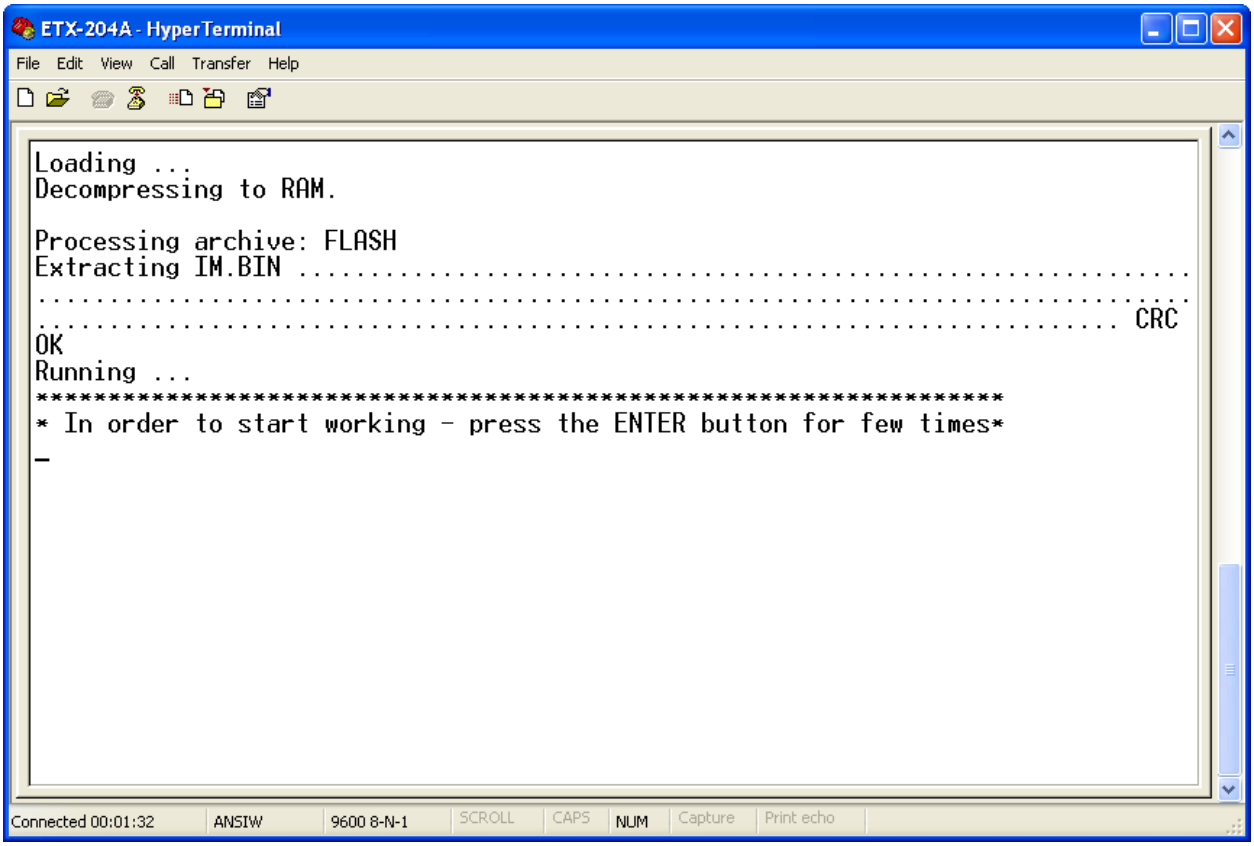


Figure 3-5. HyperTerminal Window after Startup

11. Press <**ENTER**> until you receive the login prompt. Refer to *Logging In* for details on logging in.

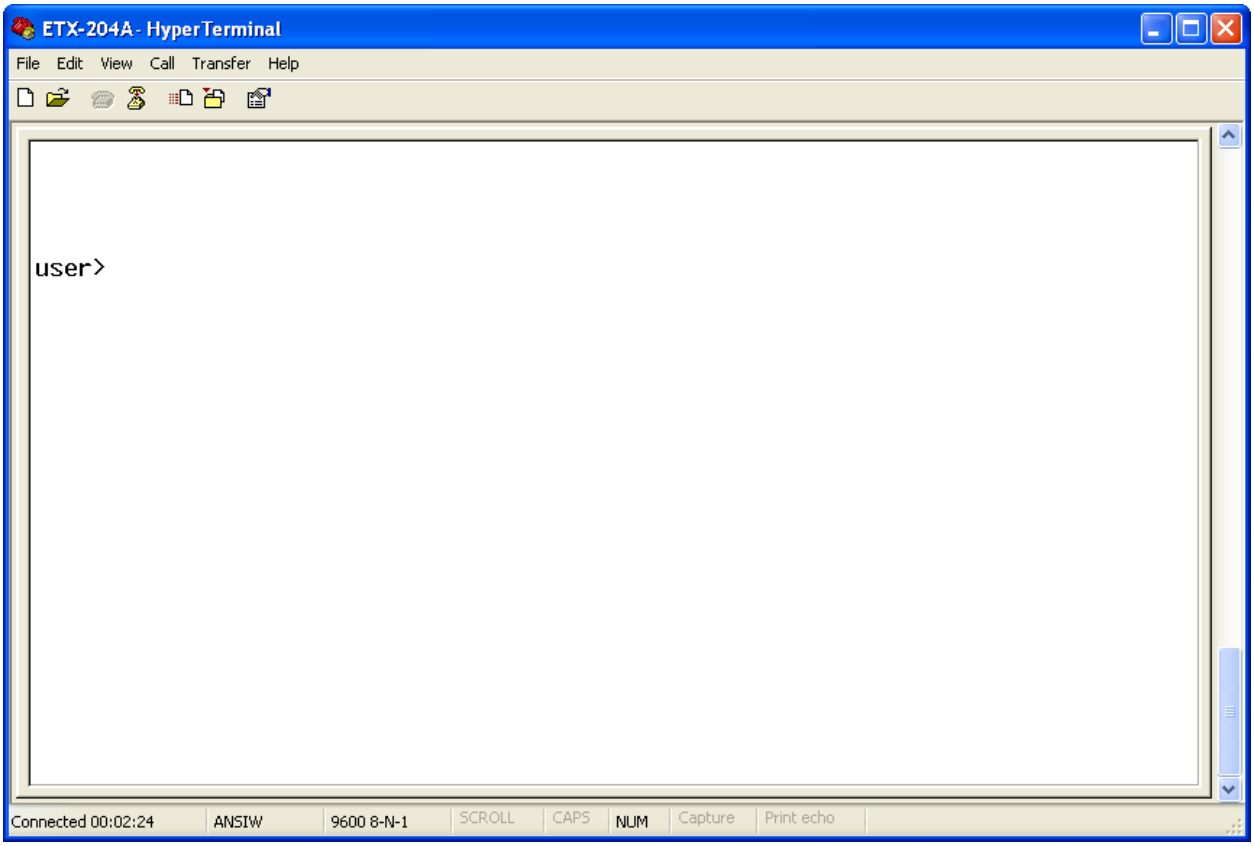


Figure 3-6. Login Prompt

Logging In

To prevent unauthorized modification of the operating parameters, ETX-204A supports two access levels:

- **Superuser** can perform all the activities supported by the ETX-204A management facility, including defining new users.
- **User** access rights (**full control** or **read only**) are defined by the superuser. Users are not allowed to create new users.

Note *It is recommended to change default passwords to prevent unauthorized access to the unit.*

➤ **To enter as superuser:**

1. At the User prompt (**user>**), Enter **su** and press ‹**Enter**›.

   The Password prompt (**password>**) appears.

2. Enter **1234** as password and press ‹**Enter**›.

   The base prompt **ETX-204A#** appears.

Superuser allows you to configure all parameters of ETX-204A and to change the **su** and **user** passwords.

➤ **To enter as User:**

1. Enter **user** as user name and press <**Enter**>.
2. Enter **1234** as password and press <**Enter**>.

   The base prompt **ETX-204A#** appears.

Using the CLI

The CLI consists of commands organized in a tree structure, starting at the base prompt **ETX-204A#**. The base prompt is the device name, which can be configured in the system level (refer to *Configuring Device Information* in Chapter 4). By default the device name is ETX-204A.

Commands that are not global are available only at their specific tree location. To find out what commands are available at the current location, type **?**. For a list of the commands and their levels, refer to *Command Tree*.

To navigate down the tree, type the name of the next level. The prompt then reflects the new location, followed by **#**. To navigate up, use the global command **exit.** To navigate all the way up to the root, type **exit all**.

At the prompt, one or more level names separated by a space can be typed, followed (or not) by a command. If only level names are typed, navigation is performed and the prompt changes to reflect the current location in the tree. If the level names are followed by a command, the command is executed, but no navigation is performed and the prompt remains unchanged.

Note *To use show commands without navigating, type* ***show*** *followed by the level name(s) followed by the rest of the show command.*

In the following example, the levels and command were typed together and therefore no navigation was performed, so the prompt has not changed.

```
ETX-204A#
ETX-204A# configure port ethernet 1 loopback local
ETX-204A# show configure port ethernet 1 loopback
Loopback : Local            Forever

ETX-204A#
```

Figure 3-7. Commands Without Level Navigation

In the following example, the levels were typed separately and the navigation is reflected by the changing prompt.

```
ETX-204A#
ETX-204A# configure
ETX-204A>config# port
ETX-204A>config>port# ethernet 1
ETX-204A>config>port>eth(1)# loopback local
ETX-204A>config>port>eth(1)# show loopback
Loopback : Local           Forever

ETX-204A>config>port>eth(1)#
```

Figure 3-8. Commands With Level Navigation

Note *Level names are abbreviated in the prompt.*

You can type only as many letters of the level or command as required by the system to identify the level or command, for example you can enter **config manag** to navigate to the **management** level.

In addition to being the default prompt, the **#** symbol also indicates a static entity (such as a port) or already configured entity. The **$** symbol indicates a new dynamic entity (such as a flow) that takes several commands to configure. The dynamic entity is created as inactive. After the configuration is completed, it is activated by using the no shutdown command, as shown in the following example.

```
ETX-204A#
ETX-204A# configure flows flow flow1
ETX-204A>config>flows>flow(flow1)$ ingress-port ethernet 3
ETX-204A>config>flows>flow(flow1)$ egress-port ethernet 1 queue 1 block 0/1
ETX-204A>config>flows>flow(flow1)$ classifier Classifier1
ETX-204A>config>flows>flow(flow1)$ no shutdown
ETX-204A>config>flows>flow(flow1)$exit
ETX-204A>config>flows#
```

Figure 3-9. Creating and Activating Flow

The shutdown command is also used to deactivate/disable a hardware element (such as a port), while no shutdown enables/activates it.

CLI commands have the following basic format:
command [**parameter**]{ **value1** | **value2** | **…** | **valuen** }
[**optional parameter** <value>]
where:

{} Indicates that one of the values must be selected

[] Indicates an optional parameter

<> Indicates a value to be typed by user according to parameter requirements

The following keys are available at any time:

?	Lists all commands available at the current level
<Tab>	Command autocomplete
↑	Displays the previous command
↓	Displays the next command
<Backspace>	Deletes character
<Ctrl-C>	Interrupts current command
<Ctrl-Z>	Logs out

The following commands are available at any level:

echo [<text-to-echo>]	Echoes the specified text
exec <file-name> [**echo**]	Executes a file, optionally echoing the commands
help [**hotkeys**] [**globals**]	Displays general help, or optionally just the hotkeys and/or global commands
history	Displays the command history for the current session (by default the history contains the last 10 commands)
info [**detail**]	Displays information on the current configuration
tree [**detail**]	Displays all lower command levels and commands accessible from the current context level

CLI commands can be gathered into text files called scripts. They can be created using a text editor, by recording the user commands or by saving the current configuration. The scripts can be imported from and exported to RAD devices via file transfer protocols.

Command Tree

At the CLI root, the following categories are available:

- configure
- file
- admin
- root
- global-commands.

Each category is detailed in the tables below.

Table 3-2. Commands in the configure category

Command	Description
configure	Enter configure level
| chassis	Enter chassis level
| | show environment	Display hardware component statuses
| | temperature-threshold	Specify temperature thresholds
| system	Configure system parameters
| | name	Configure name of device
| | contact	Configure contact person
| | location	Configure location of device
| | tftp	Configure TFTP parameters
| | clear-event-log	Clear event log
| | clear-cpu-utilization	Clear CPU utilization counters
| | show device-information	Display device information
| | show inventory-table	Display inventory information
| | show event-log	Display event log
| | show time	Display date and time
| | show cpu-utilization	Shows the CPU utilization
| | show buffers	Display memory buffer usage
| | inventory	Configure inventory entity
| | | alias	Configure inventory entity alias
| | | asset-id	Configure inventory entity asset ID
| | | serial-number	Configure inventory entity serial number
| | | show status	Display inventory entity status
| | date-and-time	Configure date & time parameters
| | | date-format	Configure system date format
| | | date	Configure system date
| | | time	Configure system time
| | | zone	Configure time zone and offset
| | | sntp	Configure Simple Network Time Protocol parameters
| | | | poll-interval	Configure SNTP polling interval
| | | | server	Configure SNTP server
| | | | | address	Configure SNTP server IP address
| | | | send-request	Send SNTP request to server

Command	Description
| | syslog	Configure syslog entities
| | | address	Configure target address of syslog server
| | | shutdown	Enable/disable logging of syslog entity
| | | facility	Configure facility of device
| | | severity-level	Configure severity level of device
| | | port	Configure UDP port number
| | | show statistics	Display syslog statistics
| | clock	Enter clock level
| | | station	Enter station level (station is an E1/2MHz source for synchronization)
| | | | shutdown	Enable or disable station clock
| | | | tx-clock-source	Set station timing to be derived from internal system or E1/2MHz external source
| | | | interface-type	Set interface type
| | | | line-code	Set line code
| | | | rx-sensitivity	Set receiver sensitivity
| | | domain	Enter domain level
| | | | sync-network-type	Set synchronization network type
| | | | quality	Set quality of clock
| | | | max-frequency-deviation	[Not supported in Ver. 2.2]
| | | | mode	Set clock mode
| | | | force	Force selection of a particular clock source
| | | | manual	Manually select a particular clock source
| | | | clear	Cancel previously issued **`force`** or **`manual`** command
| | | | clear-statistics	Clear statistics for clock sources
| | | | source	Enter clock source level
| | | | | priority	Set priority
| | | | | quality-level	Set quality level
| | | | | wait-to-restore	Define amount of time that a previously failed synchronization source must be fault free in order to be considered available
| | | | | hold-off	Define amount of time that signal failure must be active before it is transmitted
| | | | | clear-wait-to-restore	Cancel the wait-to-restore timer of a clock source
| | | | | show status	Display status

Command	Description
| | | | | show statistics	Display statistics
| | | | show status	Display status
| management	Configure management parameters
| | user	Create/delete user
| | show users	Display users
| | host	Configure host parameters
| | | dhcp	Enable or disable DHCP
| | | ip-address	Configure host IP address
| | | default-gateway	Configure IP address of default gateway
| | | arp-timeout	Configure ARP timeout
| | | show status	Display host status
| | snmp	Configure SNMP parameters
| | | community	Configure SNMP read, write, and trap community
| | | trap-mask	Mask specific alarm traps to all network managers
| | | trap-delay	Configure delay for sending trap
| | | snmp-engine-id-string	Text, administratively assigned. Maximum remaining length 27
| | | snmpv3	Enable or disable SNMPv3
| | | show snmpv3 information	Display SNMPv3 information
| | | user	Configure SNMPv3 user
| | | | shutdown	Activate or deactivate SNMPv3 user
| | | | authentication	Configure authentication for SNMPv3 user
| | | | privacy	Configure privacy for SNMPv3 user
| | | access-group	Configure SNMPv3 access group
| | | | shutdown	Activate or deactivate SNMPv3 access group
| | | | context-match	Configure context match
| | | | read-view	Configure read view
| | | | write-view	Configure write view
| | | | notify-view	Configure notify view
| | | security-to-group	Configure security for access group
| | | | shutdown	Activate or deactivate security for access group
| | | | group-name	Specify access group
| | | view	Configure SNMPv3 view
| | | | shutdown	Activate or deactivate

Command	Description
| | | | mask	Configure SNMPv3 view mask
| | | | type	Configure SNMPv3 view type
| | | community	Configure SNMPv3 community
| | | | shutdown	Activate or deactivate
| | | | name	Configure SNMPv3 community name
| | | | sec-name	Configure SNMPv3 community security name
| | | | tag	Configure SNMPv3 community tag
| | | target-params	Configure SNMPv3 target parameters
| | | | shutdown	Activate or deactivate SNMPv3 target parameters
| | | | message-processing-model	Configure SNMPv3 target parameters message processing model
| | | | version	Configure SNMPv3 target parameters version
| | | | security	Configure SNMPv3 target parameters security
| | | target	Configure SNMPv3 target
| | | | shutdown	Activate or deactivate SNMPv3 target
| | | | target-params	Configure SNMPv3 target parameters
| | | | tag-list	Configure SNMPv3 target tag list
| | | | address	Configure SNMPv3 target address
| | | | trap-sync-group	Configure trap synchronization group with SNMPv3 managers
| | | notify	Configure SNMPv3 notification
| | | | shutdown	Activate or deactivate SNMPv3 notification
| | | | tag	Configure SNMPv3 notification tag
| | | | bind	Configure SNMPv3 notification bind
| | | notify-filter	Configure SNMPv3 notification filter
| | | | shutdown	Activate or deactivate SNMPv3 notification filter
| | | | type	Configure SNMPv3 notification filter type
| | | | mask	Configure SNMPv3 notification filter mask
| | | notify-filter-profile	Configure SNMPv3 notification filter profile
| | | | shutdown	Activate or deactivate SNMPv3 notification filter profile
| | | | profile-name	Configure SNMPv3 notification filter profile name
| | trap-sync-group	Configure trap synchronization group with SNMPv3 managers

Command	Description
| | | target-params	Configure target parameters for trap synchronization group with SNMPv3 managers
| | | tag-list	Configure tag list for trap synchronization group with SNMPv3 managers
| | show trap-sync	Display the trap synchronization information if SNMPv3 is enabled
| | access	Configure management access
| | | telnet	Configure telnet access
| | | ssh	Configure SSH access
| | | snmp	Configure SNMP access
| | | auth-policy	Configure policy of authentication
| | radius	RADIUS parameters
| | | server	Create/delete RADIUS server
| | | | address	Configure address of RADIUS server
| | | | shutdown	Enable/disable RADIUS server
| | | | key	Configure client and RADIUS server shared secret
| | | | retry	Configure number of request attempts from RADIUS server
| | | | timeout	Configure timeout for a response from RADIUS server
| | | | auth-port	Configure logical port to be used by the authentication protocol
| | | show status	Display RADIUS status
| | | show statistics	Display RADIUS statistics
| | manager	Configure network manager
| | | udp-port	Define UDP port used to send traps
| | | trap-mask	Mask or unmask traps to network manager
| | | trap-sync-group	Configure trap synchronization group with SNMPv1 managers
| | | | trap-mask	Configure trap masking for trap synchronization group with SNMPv1 managers
| | show trap-sync	Display the trap synchronization information if SNMPv3 is not enabled
| qos	Enter quality of service level
| | policer-profile	Configure a policer profile
| | | bandwidth	Define the bandwidth for the policer profile

Command	Description
| | | traffic-type	Define the policed traffic type
| | | compensation	Define how many bytes to compensate for layer 1 overhead
| | policer-aggregate	Configure policer aggregate that specifies a policer profile to apply to a group of flows
| | | policer	Define policer profile for the policer aggregate
| | | show statistics	Display policer aggregate statistics
| | | show flows	Display the flows corresponding to policer aggregate
| | | clear-statistics	Clear policer aggregate statistics
| | | rate-sampling-window	Configure interval for rate sampling statistics
| | shaper-profile	Configure shaper profile
| | | bandwidth	Define the bandwidth for the shaper profile
| | | compensation	Define how many bytes to compensate for layer 1 overhead
| | marking-profile	Configure a marking profile to map the P-bit, IP precedence, or DHCP classifications to the egress priority tags
| | | mark	Map the user priority to a priority marking value
| | queue-block-profile	Configure queue block profile
| | | queue	Define queue
| | | | scheduling	Define the queue scheduling method
| | | | depth	Define the queue length
| | queue-group-profile	Configure queue group profile
| | | queue-block	Configure queue block
| | | | name	Define the name of the queue block
| | | | profile	Define the queue block profile for the queue block
| | | | bind	Bind to next level block in specific queue
| | | | shaper	Define the shaper profile for the queue block
| | queue-map-profile	Define a queue map profile to map the P-bit, IP precedence, or DSCP classifications to internal priority queues (classes of service)
| | | map	Define the mapping between the user priority and the queue id
| | wred-profile	Configure WRED profile
| | color	Configure the minimum and maximum queue usage threshold, and percentage of packets to drop when queue reaches maximum usage threshold

Command	Description
| fault	Enter fault level
| | fault-propagation	Configure fault propagation
| | | action-on-group	Action(s) to perform in order to propagate a fault
| | | trigger	Trigger for propagating fault
| | | wait-to-restore	Define the time between recovery and resumption of transmission
| | cfm	Enter fault CFM level
| | | service	Configure event reporting for service
| | | | frames-report	Define event reporting type for service
| oam	Enter OAM level
| | efm	Enter OAM EFM level
| | | descriptor	Configure OAM EFM descriptor
| | cfm	Enter OAM CFM level
| | | multicast-addr	Define the multicast address for OAM messages
| | | maintenance-domain	Configure a maintenance domain (MD)
| | | | name	Define the name of the MD
| | | | md-level	Define the level of the MD
| | | | proprietary-cc	Define whether the OAM protocol of the MD is standard or pre-standard
| | | | maintenance-association	Configure a maintenance association (MA)
| | | | | name	Define the name of the MA
| | | | | ccm-interval	Define the continuity check interval of the MA
| | | | | mep	Configure a maintenance endpoint (MEP)
| | | | | | remote-mep	Define a remote MEP for the MEP
| | | | | | show remote-mep status	Display status of remote MEP (**show remote-mep** <**remote-mep-id**> **status**)
| | | | | | dest-addr-type	Define MAC address types sent in OAM continuity check messages and in performance measurement messages, as standard multicast address or user-defined unicast address
| | | | | | dest-mac-addr	Define the unicast MAC address sent in OAM CCM messages if you defined unicast MAC address type for CCM messages
| | | | | | continuity-verification	Define continuity verification as CC-based or lb-based (only if OAM protocol is pre-standard and ccm-initiate is enabled)
| | | | | | ccm-initiate	Enable or disable continuity check messages

Command	Description
| | | | | | ccm-priority	Define the priority of the CC message
| | | | | | lbm	Configure OAM loopback
| | | | | | linktrace	Configure OAM link trace
| | | | | | classification	Associate the MEP with a classifier profile or VLAN
| | | | | | shutdown	Activate or deactivate the MEP
| | | | | | show status	Display status of MEP
| | | | | | show lbm-results	Display result of OAM loopback
| | | | | | show linktrace-results	Display result of OAM link trace
| | | | | | service	Configure MEP service
| | | | | | | shutdown	Activate or deactivate the MEP service
| | | | | | | delay-threshold	Define delay threshold for the MEP service
| | | | | | | delay-var-threshold	Define delay variation threshold for the MEP service
| | | | | classification	Associate service with p-bit
| | | | | interval	Define interval for performance measurement messages to service remote NEs
| | | | | | clear-statistics	Clear the OAM CFM statistics for service
| | | | | | show statistics	Display the OAM CFM statistics for service
| | | | | | dest-ne	Configure destination NE
| | | | | | | remote	Define remote MAC address or remote MEP ID
| | | | | | | pm	Enable or disable performance measuring
| | | | | | | clear-statistics	Clear the OAM CFM statistics for destination NE
| | | | | | | show statistics	Display the OAM CFM statistics for destination NE
| port	Enter configure port level
| | rate-sampling-window	Configure interval for rate sampling statistics
| | show summary	Display the status of all Ethernet ports
| | l2cp-profile	Define L2CP profile
| | | mac	Define MAC address L2CP action
| | | default	Default action for undefined control protocols
| | | protocol	Choose specific protocol
| | ethernet	Configure Ethernet port
| | | name	Define port name
| | | shutdown	This command administratively disables a port. The no form of this command administratively enables a port.

Command	Description
| | | auto-negotiation	Configure auto negotiation ability
| | | max-capability	Configure maximum capability advertising
| | | speed-duplex	This command configures the speed and duplex of an Ethernet port when auto negotiation is disabled.
| | | tag-ethernet-type	This command specifies the Ethertype expected in Ethernet packet
| | | tx-ssm	Enable or disable transmitting of clock availability and quality via SSM
| | | efm	Enable or disable link OAM EFM for Ethernet port
| | | | snmp-tunneling	Define SNMP tunneling for OAM EFM
| | | egress-mtu	Define the maximum transmission unit (MTU)
| | | queue-group	Define queue group profile for port
| | | loopback	This command puts the specified port into a loopback mode. The no form of the command disables the specified type of lookback.
| | | l2cp	Assign L2CP profile to Ethernet port
| | | functional-mode	Determine if second network port works in user mode or network. If in network then redundancy is available
| | | clear-statistics	Clear Ethernet port statistics
| | | clear-l2cp-statistics	Clear L2CP statistics
| | | dhcp-request	Configure whether DHCP request should be sent whenever the port is activated
| | | show status	Display Ethernet port status
| | | show statistics	Display Ethernet port statistics
| | | show oam-efm	Display OAM EFM status
| | | show oam-efm-statistics	Display OAM EFM statistics
| | | show loopback	Display loopback status
| | | show l2cp-statistics	Display L2CP statistics
| | lag	Configure LAG
| | | shutdown	Activate or deactivate the LAG
| | | admin-key	Define an admin key that indicates the port speed
| | | bind	Bind a port to the LAG
| | | lacp	Enable the LACP protocol on the LAG
| | | distribution-method	Define the distribution method

Command	Description
| | | sys-priority	Assign value used to build LAG ID, which determines aggregation precedence
| | | show members-status	Display the status of the LAG members
| | | show members-statistics	Display statistics for the LAG members
| flows	Enter flows level
| | rate-sampling-window	Configure interval for rate sampling statistics
| | show summary	Display information for all flows
| | classifier-profile	Configure a classifier profile
| | | match	Specifies the criteria for the classifier profile
| | flow	Configure flow
| | | shutdown	Activate or deactivate the flow
| | | classifier	Associate the flow with a classifier profile
| | | drop	Discard traffic transmitted via the flow
| | | policer	Associate the flow with a policer profile or aggregate
| | | mark	Enter marking level for overwriting VLAN or inner VLAN
| | | | vlan	Overwrite VLAN with a new value
| | | | marking-profile	Overwrite p-bit for VLAN as specified by marking profile
| | | | p-bit	Overwrite p-bit for VLAN
| | | | inner-vlan	Overwrite inner VLAN
| | | | inner-marking-profile	Overwrite p-bit for inner VLAN as specified by marking profile
| | | | inner-p-bit	Overwrite p-bit for inner VLAN
| | | vlan-tag	Perform push/pop of VLAN or inner VLAN, optionally with p-bits
| | | ingress-port	Define the ingress port of the flow
| | | egress-port	Define the egress port of the flow
| | | test	This command puts the specified flow into a loopback mode. The no form of the command disables the specified type of loopback.
| | | show statistics	Display statistics for the flow
| | | clear-statistics	Clear statistics for the flow
| | | show test	Display flow test status
| protection	Configure link protection
| | ethernet-group	Define Ethernet group

Command	Description
| | | bind	Add/remove protection and working ports
| | | shutdown	Activate or deactivate Ethernet group
| | | oper-mode	Define protection mode as 1-to-1 or manual
| | | revertive	Define whether port recovery mode is revertive (traffic switched back to the primary port after it recovers)
| | | wait-to-restore	Define time between recovery and resumption of transmission
| | | tx-down-duration-upon-flip	Define period of time that failed link stops transmitting to report the failure
| | | force-active-port	Define if port is forced to be active
| | | show status	Display protection status
| terminal	Configure control port parameters
| | baud-rate	Define control port data rate
| | timeout	Define security timeout
| | length	Define number of rows to display

Table 3-3. Commands in the file category

Command	Description
file	Enter file level
| copy	Copy files
| swap	Swap files
| delete	Delete file
| dir	Displays files in base directory
| show version	Display active, main, and backup software file versions, dates, and times

Table 3-4. Commands in the admin category

Command	Description
admin	Administrative commands
| reboot	Restart the device
| factory-default	Reset the device to factory defaults
| user-default	Reset the device to user defaults

Table 3-5. Commands in the root category

Command	Description
clear-statistics	Clear statistics for Ethernet ports, flows, and OAM services

Table 3-6. Commands in the global-commands category

Command	Description
global-commands	Global commands can be typed at any level
| exit	Return to previous level in the commands hierarchy
| tree	Display the commands hierarchy from current context
| help	Display help
| history	Display commands history
| echo	Echo the text that is typed in
| exec	Execute a file
| logout	Log out this system
| info	Print configuration info
| ping	Verify the reachability of a remote host
| save	Save user configuration
| trace-route	Determine the route to a destination address

Working with RADview

RADview-EMS is a user-friendly and powerful SNMP-based element management system (EMS), used for planning, provisioning and managing heterogeneous networks. RADview-EMS provides a dedicated graphical user interface (GUI) for monitoring RAD products via their SNMP agents. RADview-EMS for ETX-204A is bundled in the RADview-EMS package for PC (Windows-based) or Unix.

For more details about this network management software, and for detailed instructions on how to install, set up, and use RADview, contact your local RAD partner or refer to the RADview-EMS User's Manual at the RAD website.

3.4 Startup

Configuration Files

The following files contain configuration settings:

- **factory-default** – Contains the manufacturer default settings
- **running-config** – Contains the current configuration that is different from the default configuration
- **startup-config** – Contains saved non-default user configuration. This file is not automatically created. You can use the **save** or **copy** command to create it.
- **user-default-config** – Contains default user configuration. This file is not automatically created. You can use the **copy** command to create it.
- **main-sw** – Contains the active software image.

Refer to *Chapter 4* for details on file operations.

Note *The **save** command is used to save the user configuration. Some commands that reset the device also erase the saved user configuration by copying another file to it before the reset. Refer to* Figure 3-10 *for details.*

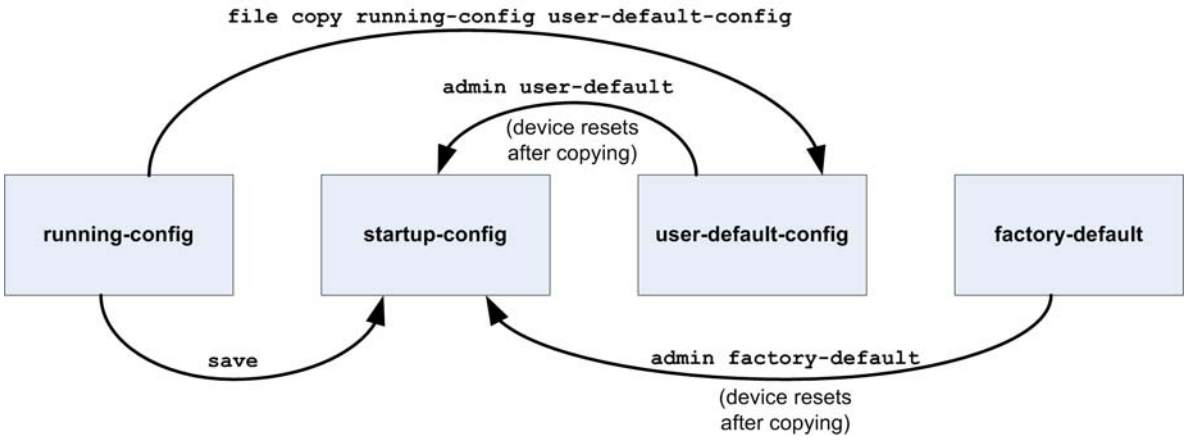


Figure 3-10. Commands That Reset Device/Copy Configuration Files

Loading Sequence

At startup, the device boots from the **startup-config** file, or the **user-default** file, or the **factory-default** file, in the sequence shown in *Figure 3-11*. If none of these files exist, the device boots using hard-coded defaults.

If the loading of **startup-config** or the **user-default** file fails, the file is deleted, the loading failure event is written in the event log, and the device reboots. After the reboot the device again attempts to load configuration files in the sequence shown in *Figure 3-11*.

To display the parameter values after startup, use the **`info [detail]`** command.

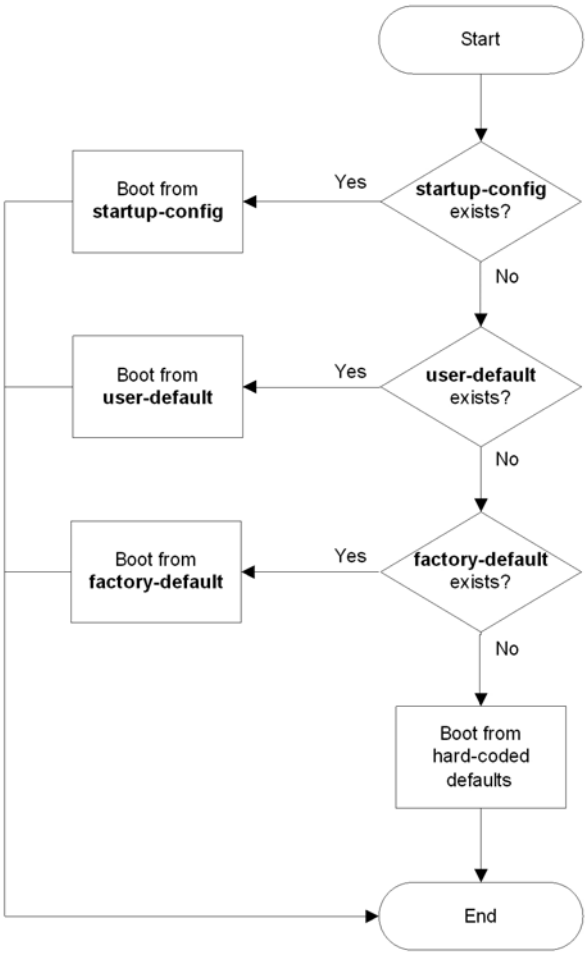


Figure 3-11. Loading Sequence

3.5 Using a Custom Configuration File

In large deployments, often a central network administrator sends configuration scripts to the remote locations and all that remains for the local technician to do is to replace the IP address in the script or other similar minor changes (using any text editor), and then download the file to the device.

To download the configuration file, use the copy command, as explained in *Chapter 4*. It is recommended to copy the file to both **startup-config** and the **user-default** file.

After downloading the configuration file, the unit must be reset in order to execute the file. After the unit completes its startup, the custom configuration is complete.

3.6 Turning Off the Unit

➤ To power off the unit:

- Remove the power cord from the power source.

Chapter 4

Configuration

This chapter lists the commands used to configure ETX-204A and explains their parameters.

This chapter includes the following sections:

- *Management Connectivity*
- *Ethernet Ports*
- *Network Interface Redundancy*
- *Quality of Service (QoS)*
- *Flows*
- *Ethernet OAM*
- *Clock Selection*
- *Fault Propagation*
- *Date and Time*
- *Syslog*
- *Configuring Temperature Threshold*
- *Clearing Device Statistics*
- *Working with the Inventory*
- *Displaying Environment*
- *Displaying Software Versions*
- *Displaying CPU and Memory Utilization*
- *File Operations*
- *Saving Configuration*
- *Reset*.

For a list of commands and their context, refer to *Chapter 3*.

Note *When you enter a level that causes the creation of a dynamic entity, **$** is displayed at the end of the prompt until you exit the entity level. The next time you enter the entity level, **#** is displayed at the end of the prompt. For the purposes of illustration, **#** is usually shown at the end of the prompts in this chapter. Examples of dynamic entities include QoS profiles and OAM CFM entities.*

4.1 Management Connectivity

Usually, initial configuration of the management parameters is performed via ASCII terminal. Once the ETX-204A host IP parameters have been set and the management flows to/from the host have been defined, it is possible to access it via Telnet or RADview for operation configuration. Perform the following steps in order to configure ETX-204A for management:

- *Configuring the Host IP Settings*
- *Configuring Device Information*
- *Configuring for SNMP Management*
- *Controlling Management Access*
- *Configuring User Access*.

Configuring the Host IP Settings

ETX-204A can be managed by a network management station, located on the LAN and connected to one of the unit's Ethernet ports. In order to establish a proper connection, it is necessary to configure the host IP address, the subnet mask and a default gateway. In addition, for management you must define flows between the host and network port with the following conditions (see *Configuring Management Flows* for an example of defining management flows):

- The flow to the host should use classification untagged, or tagged with the management VLAN if applicable
- The flow from the host should forward all traffic (classification "all"), with push action of the management VLAN and priority if applicable
- The flows to/from the host can also use classification VLAN + inner VLAN.

You can obtain the host IP parameters via DHCP if enabled, otherwise you can configure the host IP parameters manually.

Working with DHCP

To facilitate integration of a new device into a DHCP IP network, if DHCP is enabled then ETX-204A requests IP host parameters from the DHCP server upon booting up. ETX-204A is shipped with the DHCP client enabled.

Note *To enable IP connectivity in DHCP mode, make sure that the relevant port has been made accessible.*

Disabling DHCP

➤ To disable the DHCP client:

1. Navigate to **`configure management host 1`**.

   The **`config>mngmnt>host(1)#`** prompt is displayed.

Note *When you navigate to the host context you provide a host index that is always 1.*

2. Enter **no dhcp**.

   ETX-204A resets the host IP address to 0.0.0.0, while preserving the IP mask and default gateway values. Telnet/SSH connections to ETX-204A are terminated. The unit is not accessible via Internet until you manually configure an IP address and default gateway, unless you entered a default IP address previously with the **dhcp** command.

Enabling DHCP

To enable DHCP, remove the defined host IP address and default gateway, then enable DHCP

➤ **To enable the DHCP client and acquire IP parameters:**

1. Navigate to **configure management host 1**.

   The **config>mngmnt>host(1)#** prompt is displayed.

2. Enter the following commands:
   no ip-address
   no default-gateway.

   The IP address and mask are set to 0.0.0.0, and the default gateway is removed.

3. Enter **dhcp** [**default-ip** <IP-address/IP-mask>].

   ETX-204A starts broadcasting requests for an IP address. When the DHCP server is found, ETX-204A receives from it all necessary host IP parameters. If specified, a default IP address is associated with ETX-204A in the event the DHCP server is unavailable.

Note *When the IP address lease is about to expire, the DHCP client automatically requests a lease extension.*

Setting Host IP Parameters

You can enter the host IP address and default gateway manually when DHCP is disabled. You can also specify the ARP timeout.

➤ **To define the IP parameters manually:**

1. Navigate to **configure management host 1**.

   The **config>mngmnt>host(1)#** prompt is displayed.

Note *When you navigate to the host context, you provide a host index that is always 1.*

2. Enter all necessary commands according to the tasks listed below.

Task	Command	Comments
Defining the host IP address and IP mask ***Note**: This command is available only when DHCP is disabled.*	**ip-address** <host-IP-address>/<IP-mask>	The IP mask is a decimal number that specifies the number of high-order consecutive bits set to 1 in the mask (refer to example below). For example, to define IP address 192.178.1.175 with IP mask 255.255.255.0, enter: **ip-address 192.178.1.175/24**
Defining the default gateway IP address ***Note**: This command is available only when DHCP is disabled.*	**default-gateway** <gateway-IP-address>	The default gateway must be in the same subnet as the host
Specifying the ARP timeout	**arp-timeout** <seconds>	The value can be 300–1,000,000
Displaying the host IP settings	**show status**	

Configuring Device Information

The ETX-204A management software allows you to assign a name to the unit, add its description, specify its location to distinguish it from the other devices installed in your system, and assign a contact person.

➤ To configure device information:

1. Navigate to **configure system**.

   The **config>system#** prompt is displayed.

2. Enter the necessary commands according to the tasks listed below.

Task	Command	Comments
Assigning device name	**name** <device-name>	The device name has unlimited length, but if you enter a name with more than 20 characters, the prompt displays only the first 20 characters followed by 0. For example, this command that defines a 25-character device name: **ETX-204A# config sys name ETXETXETXETXETX-204A12345** results in this prompt that shows the first 20 characters, followed by 0: **ETXETXETXETXETX-204A0#**
Specifying location	**location** <device-location>	
Specifying contact person	**contact** <contact-person>	
Displaying device information, MAC address, and amount of time device has been running	**show device-information**	

For example:

➤ To configure device information:

- Device name – ETX-204A-HAC
- Location – floor-8
- Contact –Engineer-1.

```
ETX-204A# configure system
ETX-204A>config>system# name ETX-204A-HAC
ETX-204A-HAC >config>system# location floor-8
ETX-204A-HAC >config>system# contact Engineer-1
ETX-204A-HAC >config>system# show device-information

Description : ETH NTU: Boot; 1.10, Hw: 0.0, Main Sw: 2.2, Back-up Sw: 2.2
Name        : ETX-204A-HAC
Location    : floor-8
Contact     : Engineer-1
MAC Address : 00-20-D2-30-CC-9D
Sysup Time  : 000:00:04:10
```

Configuring for SNMP Management

If you intend to manage ETX-204A via SNMPv1, you have to specify the SNMP read, write, and trap communities (SNMPv3 must be disabled). If you wish to use SNMPv3, you have to ensure that it is enabled, then specify the necessary parameters.

Refer to *Setting SNMP Communities* for details on setting the communities, or to *Configuring SNMPv3* for details on setting SNMPv3 parameters.

Note *To check if SNMPv3 is enabled or disabled, navigate to* ***`configure management snmp`*** *and type* ***`info detail`****, then locate the line in the output that contains either* ***`snmpv3`*** *(SNMPv3 is enabled) or* ***`no snmpv3`*** *(SNMPv3 is not enabled). To enable or disable SNMPv3, refer to* Enabling or Disabling SNMPv3*.*

SNMP Default Configuration

The following is the default configuration of the SNMP parameters:

- SNMPv3 not enabled
- SNMP engine ID set to device MAC address
- Read community = `"public"`
- Write community = `"private"`
- Trap community = `"public"`
- Following traps masked: link-up-down, login-successful-failed
- Following trap not masked: power-failure
- No delay in sending traps.

Enabling or Disabling SNMPv3

➤ **To enable SNMPv3:**

1. Navigate to **`configure management snmp`**.

   The **`config>mngmnt>snmp#`** prompt is displayed.

2. Type **`snmpv3`**.

   SNMPv3 is enabled, and SNMPv3 commands are available. The manager list is deleted.

Note *If the SNMP management access is set to managers only, the ETX-204A device is not accessible from NMS stations due to the manager list being deleted. To prevent this, you should change the SNMP management access to allow access by all before enabling SNMPv3. Refer to* Controlling Management Access *for details on changing management access.*

➤ **To disable SNMPv3:**

1. Navigate to **`configure management snmp`**.

   The **`config>mngmnt>snmp#`** prompt is displayed.

2. Type **`no snmpv3`**.

   SNMPv3 is disabled, and the commands for setting SNMPv1 communities are available.

Setting SNMP Communities

To establish a proper management link when working with SNMPv1, you have to specify the SNMP read, write, and trap communities.

Note *The read, write, and trap communities cannot be set if SNMPv3 is enabled. Refer to* Enabling or Disabling SNMPv3 *for the procedure to disable it.*

You can specify the community with read-only authorization, the community with write authorization, and the community to which ETX-204A sends traps.

➤ **To configure ETX-204A communities:**

1. Navigate to **`configure management snmp`**.

   The **`config>mngmnt>snmp#`** prompt is displayed.

2. To specify the communities, enter:
   `community` [**`read`** <read-community>] [**`write`** <write-community>] [**`trap`** <trap-community>].

SNMPv3 Default Configuration

The following is the default configuration of the SNMPv3 parameters (refer to *Configuring SNMPv3 Parameters* for explanations of the parameters):

- SNMP engine ID set to device MAC address
- View named "internet" providing access to IETF MIBs and IEEE MIBs

- View named “restricted” providing access to part of IETF MIBs and IEEE MIBs
- View named “STD_v1” providing access to IETF MIBs and IEEE MIBs, excluding part of SNMPv3 MIB
- User named "initial", with security level no authentication and no privacy
- Group for SNMPv3 named "initial":
  - Security levels: no authentication and no privacy, authentication and no privacy, authentication and privacy
  - User: “initial”
  - Views for read/write/notify: "internet".
- Group for SNMPv1 named “v1_read”:
  - Security level: no authentication and no privacy
  - Read view = “STD_v1”
  - Write view = “”
  - Notify view = “internet”
- Group for SNMPv1 named “v1_write”:
  - Security level: no authentication and no privacy
  - Read view = “STD_v1”
  - Write view = “STD_v1”
  - Notify view = “internet”
- Group for SNMPv1 named “v1_trap”:
  - Security level: no authentication and no privacy
  - Read view = “”
  - Write view = “”
  - Notify view = “internet”.
- Target named "OAM_1":
  - Target parameter set = "SNMPv1Param"
  - Tag: “traps”
- Notifications with tag “unmasked” for following traps: agnPowerFailureTrap, agnStatusChangeTrap, agnUploadDataTrap, authenticationFailure,coldStart, ethOamCfmDefectCondition, failedLogin, fallingAlarm, linkDown, linkUp, prtStatusChangeTrap, risingAlarm, successfulLogin, tftpStatusChangeTrap, warmStart
- No delay in sending traps.

Configuring SNMPv3 Parameters

ETX-204A supports SNMP version 3, providing secure SNMP access to the device by authenticating and encrypting packets transmitted over the network.

The SNMPv3 manager application in RADview-EMS provides a user-friendly GUI interface to configure SNMPv3 parameters. If you intend to use it, you must first

use the device CLI to create users with the required encryption method and security level, as the application can create users based only on existing users; the new user has the same encryption method, and the same security level or lower. The ETX-204A default configuration provides only one standard user named "initial" with no encryption and the lowest security level (refer to *SNMPv3 Default Configuration* for details).

Follow this procedure to configure SNMPv3:

1. Set SNMP engine ID if necessary
2. Add users, specifying authentication protocol and privacy protocol
3. Add groups, specifying security level and protocol
4. Connect users to groups
5. Add notification entries with assigned traps and tags
6. Configure target parameter sets to be used for targets
7. Configure targets (SNMPv3 network management stations to which ETX-204A should send trap notifications), specifying target parameter sets and notification tags
8. If there are devices working with SNMPv1, add communities that work with SNMPv1.

Note *The SNMPv3 parameters can be set only when SNMPv3 is enabled (refer to* Enabling or Disabling SNMPv3 *for the procedure to enable it).*

➤ **To configure SNMPv3 parameters:**

1. Navigate to **`configure management snmp`**.

   The **`config>mngmnt>snmp#`** prompt is displayed.

2. Enter all necessary commands according to the tasks listed below.

Note *When you enter password parameters, they should contain at least eight characters.*

Task	Command	Level	Comments
Setting SNMP engine ID, as MAC address or IP address or string	**`snmp-engine-id mac`** [<mac-address>] **`snmp-engine-id ipv4`** [<ip-address>] **`snmp-engine-id text`** <string>	**`snmp`**	If you use the **`mac`** option and don't specify the MAC address, the SNMP engine ID is set to the device MAC address If you use the **`ipv4`** option and don't specify the IP address, the SNMP engine ID is set to the device IP address

Task	Command	Level	Comments
Configuring user	**user** <security-name> [**md5-auth** [{**des** | **none**}]] **user** <security-name> [**sha-auth** [{**des** | **none**}]] **user** <security-name> [**none-auth**]	**snmp**	If you don't specify the authentication method when creating a user, the default is MD5 with DES privacy protocol. To create a user with no authentication, specify **none-auth**. Typing **no user** <security-name> deletes the user
Setting user authentication password and optional key for changes	**authentication** [**password** <password>] [**key** <key-change>]	**snmp>user**	Using **no authentication** disables authentication protocol
Setting user privacy password and optional key for changes	**privacy** [**password** <password>] [**key** <key-change>]	**snmp>user**	Using **no privacy** disables privacy protocol
Administratively enabling user	**no shutdown**	**snmp>user**	• You must define the authentication and privacy method before you can enable the user, unless the user was defined with no authentication (**none-auth**) • Using **shutdown** disables the user.
Configuring group	**access-group** <group-name> { **any** | **snmpv1** | **snmpv2c** | **usm** } { **no-auth-no-priv** | **auth-no-priv** | **auth-priv** }	**snmp**	Using **no access-group** deletes the group
Setting read view of group	**read-view** <read-view-name>	**snmp>group**	
Setting write view of group	**write-view** <write-view-name>	**snmp>group**	
Setting notify view of group	**notify-view** <notify-view-name>	**snmp>group**	
Administratively enabling group	**no shutdown**	**snmp>group**	Using **shutdown** disables the group

Task	Command	Level	Comments
Connecting security name to group (e.g. connecting user or community for SNMPv1 to group)	**security-to-group** { **any** | **snmpv1** | **snmpv2c** | **usm** } **sec-name** <security-name>	**snmp**	Using **no security-to-group** removes security-to-group entity
Specifying group to which to connect security name	**group-name** <group-name>	**snmp>security-to-group**	
Administratively enabling security-to-group entity	**no shutdown**	**snmp>security-to-group**	Using **shutdown** disables the security-to-group entity
Configuring notification	**notify** <notify-name>	**snmp>**	
Assigning trap to notification	**bind** { **agnPowerFailureTrap** | **agnStatusChangeTrap** | **agnUploadDataTrap | tftpStatusChangeTrap** | **prtStatusChangeTrap | agnFanFailureTrap** | **successfulLogin** | **failedLogin** | **agnTempThresholdTrap** | **authenticationFailure** | **coldStart** | **warmStart** | **linkDown** | **linkUp** | **risingAlarm** | **fallingAlarm | dot3OamOperStatusChange | dot3OamPeerEvent | agnDyingGaspTrap | csmDomainStateChange | csmDomainStationStateChange | csmSourceStatusChange** | **ethOamCfmDefectCondition** }	**snmp>notify**	You can assign more than one trap to a notification, in separate commands
Assigning tag to notification, to be used to identify the notification entry when configuring target	**tag** <tag-value>	**snmp>notify**	
Administratively enabling notification	**no shutdown**	**snmp>notify**	
Configuring set of target parameters	**target-params** <target-param-name>	**snmp**	Using **no target-params** removes target parameters

Task	Command	Level	Comments
Specifying message processing model (SNMP version) to be used when generating SNMP messages for the set of target parameters	**message-processing-model** { **snmpv1** | **snmpv2c** | **snmpv3** }	**snmp>target**	
Specifying SNMP version to be used when generating SNMP messages for the set of target parameters	**version** { **any** | **snmpv1** | **snmpv2c** | **usm** }	**snmp>target**	Use **usm** for SNMPv3 version
Specifying user on whose behalf SNMP messages are to be generated for the set of target parameters	**security [name** <security-name> **] [level { no-auth-no-priv | auth-no-priv | auth-priv }]**	**snmp>target**	
Administratively enabling target parameters	**no shutdown**	**snmp>target**	Using **shutdown** disables target parameters
Configuring target	**target** <target-name>	**snmp**	Using **no target** removes target
Specifying set of target parameters for target	**target-params** <target-param-name>	**snmp>target**	
Assigning tag(s) to target (the tag(s) must be defined in notification entries)	**tag-list** <tag> **tag-list [** <tag> **]** **tag-list [** <tag1>,<tag2>,…<tagn> **]**	**snmp>target**	If you specify more than one tag, you must enclose the list with square brackets, however if you are specifying just one tag the brackets are optional
Specifying target address as IP address or OAM port	**address udp-domain** <ip-address> **address oam-domain** <oam-port>	**snmp>target**	
Administratively enabling target	**no shutdown**	**snmp>target**	Using **shutdown** disables target
Configuring community	**community** <community-identification>	**snmp**	
Configuring name	**name** <community-string>	**snmp> community**	
Configuring security name	**sec-name** <security-name>	**snmp> community**	

Task	Command	Level	Comments
Administratively enabling community	**no shutdown**	**snmp> community**	Using **shutdown** disables community
Displaying SNMPv3 information, such as the number of times the SNMPv3 engine has booted, and how long since the last boot	**show snmpv3 information**	**snmp**	

For example:

➤ To create SNMPv3 user and connect it to group:

- User named "MD5_priv":
  - Security level – MD5 authentication, DES privacy
- Group named "SecureGroup":
  - All security levels
  - Contains set of views named "internet" (from default configuration).

```
ETX-204A# configure management snmp
ETX-204A>config>mngmnt>snmp# user MD5_priv md5-auth des
ETX-204A>config>mngmnt>snmp>user(MD5_priv)$ privacy password MD54321
ETX-204A>config>mngmnt>snmp>user(MD5_priv)$ authentication password MD54321
ETX-204A>config>mngmnt>snmp>user(MD5_priv)$ no shutdown
ETX-204A>config>mngmnt>snmp>user(MD5_priv)$ exit
ETX-204A>config>mngmnt>snmp# access-group SecureGroup usm no-auth-no-priv
ETX-204A>config>mngmnt>snmp>access-group(SecureGroup usm no-auth-no-priv)$ read-view internet
ETX-204A>config>mngmnt>snmp>access-group(SecureGroup usm no-auth-no-priv)$ write-view internet
ETX-204A>config>mngmnt>snmp>access-group(SecureGroup usm no-auth-no-priv)$ notify-view internet
ETX-204A>config>mngmnt>snmp>access-group(SecureGroup usm no-auth-no-priv)$ no shutdown
ETX-204A>config>mngmnt>snmp>access-group(SecureGroup usm no-auth-no-priv)$ exit
ETX-204A>config>mngmnt>snmp# access-group SecureGroup usm auth-no-priv
ETX-204A>config>mngmnt>snmp>access-group(SecureGroup usm auth-no-priv)$ read-view internet
ETX-204A>config>mngmnt>snmp>access-group(SecureGroup usm auth-no-priv)$ write-view internet
ETX-204A>config>mngmnt>snmp>access-group(SecureGroup usm auth-no-priv)$ notify-view internet
ETX-204A>config>mngmnt>snmp>access-group(SecureGroup usm auth-no-priv)$ no shutdown
ETX-204A>config>mngmnt>snmp>access-group(SecureGroup usm auth-no-priv)$ exit
ETX-204A>config>mngmnt>snmp# access-group SecureGroup usm auth-priv
ETX-204A>config>mngmnt>snmp>access-group(SecureGroup usm auth-priv)$ read-view internet
ETX-204A>config>mngmnt>snmp>access-group(SecureGroup usm auth-priv)$ write-view internet
ETX-204A>config>mngmnt>snmp>access-group(SecureGroup usm auth-priv)$ notify-view internet
ETX-204A>config>mngmnt>snmp>access-group(SecureGroup usm auth-priv)$ no shutdown
ETX-204A>config>mngmnt>snmp>access-group(SecureGroup usm auth-priv)$ exit
ETX-204A>config>mngmnt>snmp# security-to-group usm sec-name MD5_priv
ETX-204A>config>mngmnt>snmp>security-to-group(usm MD5_priv)$ group-name SecureGroup
ETX-204A>config>mngmnt>snmp>security-to-group(usm MD5_priv)$ no shutdown
ETX-204A>config>mngmnt>snmp>security-to-group(usm MD5_priv)$ exit
ETX-204A>config>mngmnt>snmp#
```

➤ To create notifications:

- Notification named "TrapData":
  - Tag = "Data"
  - Bound to agnStatusChangeTrap, agnUploadDataTrap.
- Notification named "TrapPower":
  - Tag = "Power"
  - Bound to agnPowerFailureTrap, coldStart.

```
ETX-204A# configure management snmp
ETX-204A>config>mngmnt>snmp# notify TrapData
ETX-204A>config>mngmnt>snmp>notify(TrapData)$ tag Data
ETX-204A>config>mngmnt>snmp>notify(TrapData)$ bind agnStatusChangeTrap
ETX-204A>config>mngmnt>snmp>notify(TrapData)$ bind agnUploadDataTrap
ETX-204A>config>mngmnt>snmp>notify(TrapData)$ no shutdown
ETX-204A>config>mngmnt>snmp>notify(TrapData)$ exit
ETX-204A>config>mngmnt>snmp# notify TrapPower
ETX-204A>config>mngmnt>snmp>notify(TrapPower)$ tag Power
ETX-204A>config>mngmnt>snmp>notify(TrapPower)$ bind agnPowerFailureTrap
ETX-204A>config>mngmnt>snmp>notify(TrapPower)$ bind coldStart
ETX-204A>config>mngmnt>snmp>notify(TrapPower)$ no shutdown
ETX-204A>config>mngmnt>snmp>notify(TrapPower)$ exit
ETX-204A>config>mngmnt>snmp#
```

➤ To create target parameters and target:

- Target parameters named "TargParam1":
  - Message processing model SNMPv3
  - version USM
  - User "MD5_priv"
  - Security level authentication and privacy
- Target named "TargNMS1":
  - Target parameters "TargParam1"
  - Tag list = "Data", "Power"
  - IP address 192.5.4.3.

```
ETX-204A# configure management snmp
ETX-204A>config>mngmnt>snmp# target-params TargParam1
ETX-204A>config>mngmnt>snmp>target(TargParam1)$ message-processing-model snmpv3
ETX-204A>config>mngmnt>snmp>target(TargParam1)$ version usm
ETX-204A>config>mngmnt>snmp>target(TargParam1)$ security name MD5_priv level auth-priv
ETX-204A>config>mngmnt>snmp>target(TargParam1)$ no shutdown
ETX-204A>config>mngmnt>snmp>target(TargParam1)$ exit
ETX-204A>config>mngmnt>snmp# target TargNMS1
ETX-204A>config>mngmnt>snmp>target(TargNMS1)$ target-params TargParam1
ETX-204A>config>mngmnt>snmp>target(TargNMS1)$ tag-list [Data,Power]
ETX-204A>config>mngmnt>snmp>target(TargNMS1)$ address udp-domain 192.5.4.3
ETX-204A>config>mngmnt>snmp>target(TargNMS1)$ no shutdown
ETX-204A>config>mngmnt>snmp>target(TargNMS1)$ exit
ETX-204A>config>mngmnt>snmp#
```

➤ To create communities, target parameters, and target for devices in network that are working with SNMPv1 :

- Community "read":
  - Name: "public"
  - Security name: "v1_read (defined in default configuration).
- Community "write":
  - Name: "public"
  - Security name: "v1_write (defined in default configuration).
- Community "trap":
  - Name: "trapcom"
  - Security name: "v1_trap (defined in default configuration).
- Target parameters named "snmpv1":
  - Message processing model SNMPv1
  - Version SNMPv1
  - Security name: "v1_trap"
  - Security: level no authentication and no privacy
- Target named "TargNMS1":
  - Target parameters "snmpv1"
  - Tag list = "unmasked"
  - IP address 192.5.6.7.

```
ETX-204A# configure management snmp
ETX-204A>config>mngmnt>snmp# community read
ETX-204A>config>mngmnt>snmp>community(read)$ name public
ETX-204A>config>mngmnt>snmp>community(read)$ sec-name v1_read
ETX-204A>config>mngmnt>snmp>community(read)$ no shutdown
ETX-204A>config>mngmnt>snmp>community(read)$ exit
ETX-204A>config>mngmnt>snmp# community write
ETX-204A>config>mngmnt>snmp>community(write)$ name public
ETX-204A>config>mngmnt>snmp>community(write)$ sec-name v1_write
ETX-204A>config>mngmnt>snmp>community(write)$ no shutdown
ETX-204A>config>mngmnt>snmp>community(write)$ exit
ETX-204A>config>mngmnt>snmp# community trap
ETX-204A>config>mngmnt>snmp>community(trap)$ name trapcom
ETX-204A>config>mngmnt>snmp>community(trap)$ sec-name v1_trap
ETX-204A>config>mngmnt>snmp>community(trap)$ no shutdown
ETX-204A>config>mngmnt>snmp>community(trap)$ exit
ETX-204A>config>mngmnt>snmp# target-params snmpv1
ETX-204A>config>mngmnt>snmp>target(snmpv1)$ message-processing-model snmpv1
ETX-204A>config>mngmnt>snmp>target(snmpv1)$ version snmpv1
ETX-204A>config>mngmnt>snmp>target(snmpv1)$ security name v1_trap level no-auth-no-
priv
ETX-204A>config>mngmnt>snmp>target(snmpv1) no shutdown
ETX-204A>config>mngmnt>snmp>target(snmpv1) exit
ETX-204A>config>mngmnt>snmp# target snmpv1NMS
ETX-204A>config>mngmnt>snmp>target(snmpv1NMS)$ target-params snmpv1
ETX-204A>config>mngmnt>snmp>target(snmpv1NMS)$ tag-list unmasked
ETX-204A>config>mngmnt>snmp>target(snmpv1NMS)$ address udp-domain  192.5.6.7
ETX-204A>config>mngmnt>snmp>target(snmpv1NMS)$ no shutdown
ETX-204A>config>mngmnt>snmp>target(snmpv1NMS)$ exit
ETX-204A>config>mngmnt>snmp#
```

➤ To display SNMPv3 information:

```
ETX-204A# configure management snmp
ETX-204A> config>mngmnt>snmp# show snmpv3 information
SNMPv3           : enable
Boots            : 2
Boots Time (sec) : 102
EngineID         : 800000a4030020d2202416
ETX-204A>config>mngmnt>snmp#
```

Configuring Network Managers

You can define the network management stations to which the SNMPv1 agent of ETX-204A sends traps, and from which ETX-204A can be managed. You can define up to ten managers. When you define a network manager, you can define a single IP address or an IP address and mask that specify a subnet from which ETX-204A can be managed.

Traps are sent only to a single IP address, not to a subnet. You can temporarily prevent a manager station from receiving traps by masking the network manager.

Configuring Management Subnets

➤ **To add a management subnet:**

1. Navigate to the management context (**config>mngmnt**).
2. Enter
   manager <ip-address>/<ip-mask>

   The parameter ip-mask is a decimal number that specifies the number of high-order consecutive bits set to 1 in the mask. For example, to specify IP mask 255.255.255.0, use 24 as the value for ip-mask.

   You must provide a valid combination of IP address and IP mask such that the result of masking the IP address with the IP mask is the IP address. In other words, the IP address and the mask should have the same number of low-order consecutive bits set to 0.

   Examples of defining a management subnet:
   manager 192.178.1.0/24
   manager 192.178.1.240/28
   manager 192.178.1.252/30

➤ **To remove a management subnet:**

- In the management context (**config>mngmnt**), enter
  no manager <ip-address>/<ip-mask>.

Configuring Network Manager Stations

➤ **To add a network manager:**

1. Navigate to the management context (**config>mngmnt**).
2. Enter
   manager <ip-address>/32.
3. To mask traps to the network manager, enter **trap-mask**
4. To define a UDP port to send SNMPv1 traps to the network manager, enter
   udp-port snmp-trap-port <udp port number>

   The default is port 162.

➤ **To remove a network manager:**

1. To delete a manager, in the management context (**config>mngmnt**), enter
   no manager <ip-address>/<ip-mask>
2. To delete all managers, enter **no manager.**

Masking Traps to Network Managers

You can mask traps to a network manager to prevent it from receiving any traps.

Note *You can also mask a trap or traps to prevent sending the trap(s) to all management stations. For details refer to* Chapter 5*.*

➤ To mask all traps to a specific network manager:

1. Navigate to **configure management manager**(<manager-ip-address>/**32**).

   The **config>mngmnt>manager**(<manager-ip-address>/**32**)**#** prompt is displayed.

2. Enter **trap-mask**.

   Traps are not sent to the specified network manager.

Note *To unmask traps to the network manager, enter* ***no trap-mask****.*

Controlling Management Access

You can enable or disable access to the ETX-204A management system via Telnet, SSH, or SNMP applications. By disabling Telnet, SSH, or SNMP, you prevent unauthorized access to the system when security of the ETX-204A IP address has been compromised. When Telnet, SSH, and SNMP are disabled, ETX-204A can be managed via an ASCII terminal only. In addition, you can limit access to the device to only the defined management stations.

Table 4-1 lists management access implementation, according to the defined management access and whether network managers are defined.

➤ To configure management access:

- At the **configure management access** prompt enter the necessary commands according to the tasks listed below.

Task	Command	Comments
Allowing Telnet access ***Note****: If you want to allow Telnet access by managers only, you must enter the command to block Telnet access.*	**telnet** [**managers-only**]	Typing **no telnet** blocks access by Telnet
Allowing SSH (Secure Shell) access ***Note****: If you want to allow SSH access by managers only, you must first enter the commands to block Telnet and SSH access.*	**ssh** [**managers-only**]	Typing **no ssh** blocks access by SSH
Allowing SNMP access ***Note****: If you want to allow SNMP access by managers only, you must first enter the command to block SNMP access.*	**snmp** [**managers-only**]	Typing **no snmp** blocks access by SNMP

Table 4-1. Management Access Implementation

Access Method	Mode	Allowed to Access ETX-204A	
		Network Manager(s) Defined	**Network Manager(s) not Defined**
Telnet Access	Enable	Anybody	Anybody
	Disable	Nobody	Nobody
	Managers Only	Only defined network managers	Nobody
SSH Access (Secure Shell)	Enable	Anybody	Anybody
	Disable	Nobody	Nobody
	Managers Only	Only defined network managers	Nobody
SNMP Access	Enable	Anybody	Anybody
	Disable	Nobody	Nobody
	Managers Only	Only defined network managers	Nobody

Defining the Access Policy

ETX-204A's access policy allows configuring authentication protocols using the Radius server. The user authentication is performed according to the selected order. If the first authentication method is not available or the user is not found, the next selected method is used.

➤ **To define the access policy:**

1. Navigate to the Access context (**`config>mngmnt>access`**).
2. To configure the first and second levels of authentication, do the following:
   - To use the locally stored database, enter **`auth-policy 1st-level`** `local`.
   - To use the authentication database stored on the Radius server, enter **`auth-policy 1st-level`** `radius` **`2nd-level`** `local`.

Note

- *The 2nd level can be configured only if the 1st level is set to **radius**.*
- *If the 2nd level is set to **none**, ETX-204A is available via only the 1st level.*
- *Special rules apply to **su** (Superuser). If **su** does not exist in the Radius server database or the system looses the connection to the Radius server, ETX-204A uses the local authentication database to authenticate the user if the 2nd level is set to **local**.*

Working with RADIUS

Configuring Radius Server Parameters

ETX-204A provides connectivity to up to four Radius authentication servers. You have to specify access parameters such as assigning Radius server IDs, specifying the associated server IP addresses and the number of retries, etc.

➤ To define Radius server parameters:

1. Navigate to the Radius context (**config>mngmnt>radius**) and enter the desired server sequence number (server ID) from 1 to 4:
   server <server-id>.

   The system switches to the context of the specified server (**config>mngmnt>radius>server(<**server-id>**)**)

2. To associate the sequence number with the Radius server's IP address, enter:
   address <ip-address>

   Possible IP addresses range from 1.1.1.1 to 255.255.255.255.

3. To specify a shared secret between client and server, enter:
   key <free text>

   The shared secret is a secret key consisting of free text known to the client and the server for encryption.

4. To specify the maximum number of authentication retries at the Radius server, enter:
   retry <number-of–retries>

   Up to 10 retries are possible. The default is 2.

5. To specify the timeout, enter:
   timeout <seconds>

   Up to 5 seconds are possible. The default is 2 seconds.

6. To specify the logical port to be used by the authentication protocol, enter:
   auth-port <udp-port-number>

   You can choose a port between 1 and 65535. The default is 1812.

7. To exit the server context, enter **exit**.

➤ To shut down a Radius server:

- Navigate to the specific server ID context (**config>mngmnt>radius>server(<**server-id>**)**) and enter **shutdown**.

➤ To activate a Radius server:

- Navigate to the specific server ID context (**config>mngmnt>radius>server(<**server-id>**)**) and enter **no shutdown**.

Displaying RADIUS Statistics

➤ To display RADIUS statistics:

- At the RADIUS context (**config>mngmnt>radius**), enter **show statistics**.

  RADIUS statistics appear as shown in *Figure 4-1*.

```
ETX-204A>config>mngmnt>radius# show statistics
                 Server1     Server2      Server3     Server4
-------------------------------------------------------------
Access Requests    : 0          0            0           0
Access Retransmits : 0          0            0           0
Access Accepts     : 0          0            0           0
Access Rejects     : 0          0            0           0
Access Challenges  : 0          0            0           0
Malformed Response : 0          0            0           0
Bad Authenticators : 0          0            0           0
Pending Requests   : 0          0            0           0
Timeouts:          : 0          0            0           0
Unknown Types      : 0          0            0           0
Packets Dropped    : 0          0            0           0
```

Figure 4-1. Radius Statistics

Configuring Control Port Parameters

ETX-204A embedded software enables you to configure the serial port parameters, which include specifying the data rate, security timeout, and length of the screen from which you are accessing the device.

➤ To define the control port parameters:

1. Navigate to the terminal context (**config>terminal**)
2. Enter the desired data rate:
   baud-rate { **9600bps** | **19200bps** | **38400bps** | **57800bps** | **115200bps** }

   The default data rate is 9,600 bps.
3. To specify that there is no security timeout, enter:
   timeout forever
4. To specify a security timeout, enter:
   timeout limited <minutes>

   The timeout value can be 0–60. The default is 10 minutes.
5. To specify the number of rows to display, enter:
   length <number-of-rows>

   The number of rows can be 0, to indicate no limit on the number of lines displayed, or 20.

Configuring User Access

ETX-204A management software allows you to define new users, their management and access rights. Only superusers (su) can create new users, the regular users are limited to changing their current passwords, even if they were given full management and access rights.

You can specify a user's password as a text string or as a hashed value, that you obtain by using **info** to display user data.

Notes

- *User passwords are stored in a database so that the system can perform password verification when a user attempts to log in. To preserve confidentiality of system passwords, the password verification data is typically stored after a one-way hash function is applied to the password, in combination with other data. When a user attempts to log in by entering a password, the same function is applied to the entered value and the result is compared with the stored value.*
- *A cryptographic hash function is a deterministic procedure that takes an arbitrary block of data and returns a fixed-size bit string, the (cryptographic) hash value, such that any change to the data changes the hash value.*

➤ To add a new user:

1. Make sure that you are logged on as superuser (su).
2. Navigate to the Management context (**config>mngmnt**).
3. Define a new user:

```
user <name> [ level { su | tech | user } ]
[[ password <password> [hash] ]
```

For example:

➤ To define a new user:

- User name = staff
- User password = 1234.

```
ETX-204A# configure management
ETX-204A>config>mngmnt# user staff level su password 1234
# Password is encrypted successfully
ETX-204A>config>mngmnt#
```

➤ To add a new user with a hashed password:

1. Define a new user with a text password.
2. Use **info** to display the password hash value.
3. Define another user with the hashed password from the **info** output.

   The second user can log in with the text password defined in *step 1*.

For example:

➤ To add a new user with a hashed password:

- User name = staff1

- User password = 4222
- User name = staff2
- User password = hash of 4222 (user staff2 can log in with password 4222).

```
ETX-204A# configure management
ETX-204A>config>mngmnt# user staff1 level user password 4222
# Password is encrypted successfully
ETX-204A>config>mngmnt# info
    user  "staff1" level  user  password
"3fda26f8cff4123ddcad0c1bc89ed1e79977acef"  hash
    user  "su"
```

:

```
ETX-204A>config>mngmnt# user staff2 level user password
3fda26f8cff4123ddcad0c1bc89ed1e79977acef hash
ETX-204A>config>mngmnt# info
    user  "staff1" level  user  password
"3fda26f8cff4123ddcad0c1bc89ed1e79977acef"  hash
    user  "staff2" level  user  password
"3fda26f8cff4123ddcad0c1bc89ed1e79977acef"  hash
    user  "su"
```

:

```
ETX-204A>config>mngmnt# logoutexiting cli
ETX-204A>config>mngmnt#


 CLI session is closed







user>staff2

password>****
```

➤ To delete an existing user:

- At the Management context (**config>mngmnt**), enter **no** <user-name>.

  The specified user is deleted.

➤ To view all connected users:

- At the Management context (**config>mngmnt**), enter **show user**s.

  A list of all connected users is displayed, showing their access level, the type of connection, and the IP address from which they are connected.

For example:

```
ETX-204A# configure management
ETX-204A>config>mngmnt# show users
User                          Access Level   Source         IP-address
------------------------------------------------------------------------
su                            SU             Terminal       172.4.3.3

ETX-204A>config>mngmnt#
```

4.2 Ethernet Ports

ETX-204A has two network ports and up to four user ports that are SFP/UTP combo ports.

The second network port can be configured as a user port. The following table shows how to refer to the ports when configuring them with CLI commands.

Table 4-2. Ethernet Port Names

Port	Port Number on Unit	Port in CLI
Net	1	Ethernet 1
Net/User	2	Ethernet 2
User	3	Ethernet 3
User	4	Ethernet 4
User	5	Ethernet 5
User	6	Ethernet 6
MNG-ETH	-	Ethernet 101

The following parameters can be configured for the Ethernet ports:

- Port name
- Autonegotiation (10/100/1000BaseT and 1000BaseX ports)
- Maximum advertised capability for autonegotiation procedure
- Data rate and duplex mode, when autonegotiation is disabled
- Administrative status
- Network or user functional mode (second network interface only)
- DHCP request sent when port is activated
- Tag Ethernet Type
- Egress MTU
- Queue group profile
- L2CP handling

- Enable/disable transmitting of Synchronization Status Message (SSM) with quality identifier that can be used to select the highest synchronization level incoming reference signal
- Link OAM EFM (IEEE 802.3-2005) – Refer to *Configuring OAM EFM*
- Loopback – Refer to *Testing Ethernet Ports*.

Configuring Ethernet Port Parameters

➤ To configure the Ethernet port parameters:

1. Navigate to **`configure port ethernet`** `<port-num>` to select the Ethernet port to configure.

   The **`config>port>eth`**`(<port-num>)#` prompt is displayed.

2. Enter all necessary commands according to the tasks listed below.

Task	Command	Comments
Enabling autonegotiation ***Note**: You can configure different values for the SFP and RJ-45 modes. The device works with the values that apply according to whether an SFP is inserted.*	**`auto-negotiation`** [{**`sfp`** | **`rj45`**}]	Using **`no`** before **`auto-negotiation`** disables autonegotiation If neither **`sfp`** nor **`rj45`** is specified, the command applies to both modes
Setting maximum advertised capability (highest traffic handling capability to be advertised during the autonegotiation process) ***Note**: This parameter applies only if autonegotiation is enabled.* *You can configure different values for the SFP and RJ-45 modes. The device works with the values that apply according to whether an SFP is inserted.*	**`max-capability`** {**`10-full-duplex`** | **`100-full-duplex`** | **`1000-full-duplex`** | **`1000-x-full-duplex`** } [{**`sfp`** | **`rj45`**}]	If neither **`sfp`** nor **`rj45`** is specified, the command applies to both modes **`10-full-duplex`** – 10baseT full duplex **`100-full-duplex`** – 100baseT full duplex **`1000-full-duplex`** – 1000base T full duplex **`1000-x-full-duplex`** – 1000baseX full duplex For fiber optic ports, permanently set to **`1000-x-full-duplex`**

Task	Command	Comments
Setting data rate and duplex mode of the Ethernet port, when autonegotiation is disabled *Notes:* • *This parameter applies only to RJ-45 copper ports when autonegotiation is disabled* • *You can configure different values for the SFP and RJ-45 modes. The device works with the values that apply according to whether an SFP is inserted* • *Do not assign 1000-full-duplex in SFP mode (do not use the command: **speed-duplex 1000-full-duplex sfp**).*	**speed-duplex** {**10-full-duplex** | **100-full-duplex** | **1000-full-duplex** | **1000-x-full-duplex** } [{**sfp** | **rj45**}]	If neither **sfp** nor **rj45** is specified, the command applies to both modes **10-full-duplex** – 10baseT full duplex **100-full-duplex** – 100baseT full duplex **1000-full-duplex** – 1000base T full duplex **1000-x-full-duplex** – 1000baseX full duplex For fiber optic ports, permanently set to **1000-x-full-duplex**
Setting the VLAN tagged frame ETH II frame Ethertype (tag protocol identifier) ***Note**: Relevant only for network ports if the egress action is set to adding an SP tag.*	**tag-ethernet-type** <**0x**0000-**0x**FFFF>	
Associating a queue group profile with the port ***Note**: You can associate a network port with a queue group profile containing up to 31 queue blocks, but a user port can be associated only with a queue group profile containing a single queue block.*	**queue-group profile** <queue-group-profile-name>	
Associating a Layer-2 control processing profile with the port	**l2cp profile** <l2cp-profile-name>	• If Ethernet port 2 is configured as a network port, then whenever you assign an L2CP profile to one of the network ports it is automatically assigned to the other network port • If you intend to enable LACP (LAG) or link OAM on the port, the associated L2CP profile must specify peer action for MAC 0x02

Task	Command	Comments
Specifying conditions for sending DHCP request	**dhcp-request** {**normal** | **when-up**}	**normal** – DHCP request is sent for the normal reasons, e.g. if the device needs to acquire an IP address or the IP address is about to expire **when-up** –In addition to the normal reasons listed above, a DHCP request is sent whenever the port is activated or becomes operational
Setting maximum frame size to transmit (frames above the specified size are discarded)	**egress-mtu** <64–12288>	
Enabling transmitting of clock availability and quality via SSM	**tx-ssm**	Using **no** before **tx-ssm** disables SSM egress
Administratively enabling port	**no shutdown**	Using **shutdown** disables the port

Setting Second Network Interface as Network or User Port

You can change the functional mode of the second network interface from network to user port and vice versa. If it functions as a user port, then redundancy is not possible.

Note *When you change the functional mode, all flows related to the port are deleted.*

➤ To change the functional mode of the second network interface:

1. Navigate to **configure port ethernet** 2.

   The **config>port>eth**(2)# prompt is displayed.

2. Enter the command to change the functional mode:
   - To change to user port, enter **functional-mode** user.
   - To change to network port, enter **functional-mode** network.

   The functional mode of the port is changed.

For example:

➤ To change the second network interface functional mode to user port:

```
ETX-204A# configure port ethernet 2
ETX-204A>config>port>eth(2)# functional-mode user
ETX-204A#
```

Configuring the Layer 2 Control Processing

ETX-204A can be configured to pass through Layer-2 Control frames (including other vendors' L2CP frames) across the network, to peer supported protocols, or to discard the L2CP frames. You can perform protocol tunneling, with MAC address swap.

You can create up to six profiles to define the handling of Layer-2 Control Protocol traffic. You then assign the required profile to an Ethernet port (refer to *Configuring Ethernet Port Parameters*).

Note *The L2CP profile for Ethernet ports that have SSM transmitting enabled must be configured to peer MAC 01-80-c2-00-00-02.*

Default Layer 2 Control Processing Profile

ETX-204A provides a default L2CP profile named L2cpDefaultProfile, configured as follows:

- For MAC hex byte 0x00 through 0xff, action = tunnel
- Default action = tunnel.

Adding Layer 2 Control Processing Profiles

➤ To add an L2CP profile:

1. Navigate to **`configure port`**.

   The **`config>port#`** prompt is displayed.

2. Type **`l2cp-profile`** `<l2cp-profile-name>`.

   An L2CP profile with the specified name is created and the **`config>port>l2cp-profile`**`(<l2cp-profile-name>)`**`$`** prompt is displayed. The new profile is configured by default as described in *Default Layer 2 Control Processing Profile*.

3. Configure the L2CP profile as needed (refer to *Configuring Layer 2 Control Processing Profiles*).

For example:

➤ To add L2CP profile named layer2ctrl1:

```
ETX-204A# configure port
ETX-204A>config>port# l2cp-profile layer2ctrl1
ETX-204A>config>port>l2cp-profile(layer2ctrl1)$
```

Deleting Layer 2 Control Processing Profiles

You can delete an L2CP profile only if it is not assigned to any port.

➤ To delete an L2CP profile:

1. Navigate to **`configure port`**.

   The **`config>port#`** prompt is displayed.

2. Type **`no l2cp-profile`** `<l2cp-profile-name>`.

   The L2CP profile with the specified name is deleted if it is not assigned to any port.

For example:

➤ To delete L2CP profile named layer2ctrl1:

```
ETX-204A# configure port
ETX-204A>config>port# no l2cp-profile layer2ctrl1
ETX-204A>config>port#
```

Configuring Layer 2 Control Processing Profiles

➤ To configure an L2CP profile:

1. Navigate to **configure port l2cp** <l2cp-profile-name> to select the L2CP profile to configure.

   The **config>port>l2cp-profile**(<l2cp-profile-name>)# prompt is displayed.

2. Specify the L2CP action for a MAC address:
   mac <hex-byte> {discard|tunnel|peer}
   - The <hex-byte> parameter is the last byte of the control protocol MAC.
   - The actions are as follows:
     - Discard – L2CP frames are discarded.
     - Tunnel – L2CP frames are forwarded across the network as ordinary data
     - Peer – ETX-204A peers with the user equipment to run the protocol. L2CP frames are forwarded to the ETX-204A CPU. Unidentified L2CP frames are forwarded across the network as ordinary data.
3. Specify the default action for undefined control protocols:
   default {discard|tunnel}
4. Choose a protocol or specify no protocol:

protocol {stp|vtp|cdp|lldp|pvstp} **tunnel mac-change [**<mac-address>**]**
no protocol {stp|vtp|cdp|lldp|pvstp}.

Note *The MAC swap option is available only for protocols: vtp, stp, cdp, and pvstp.*

Displaying Ethernet Port Status

You can display the following:

- Summary information showing the status and speed of all Ethernet ports
- Status and configuration of an individual Ethernet port.

➤ To display the status of all Ethernet ports:

- At the prompt **config>port#**, enter **show summary**.

  The port status and speeds of the Ethernet ports are displayed. If a port is being tested via the **loopback** command, it is indicated in the operational status.

For example:

```
ETX-204A# configure port
ETX-204A>config>port# show summary
Port       Number    Name      Admin     Oper                Speed
-------------------------------------------------------------------------
Fast Eth   1         ETH 1     Up        Up                  10000000
Fast Eth   2         ETH 2     Up        Testing             10000000
Fast Eth   3         ETH 3     Up        Up                  10000000
Ethernet   101       MNG-ETH   Up        Up                 100000000

ETX-204A>config>port#
```

➤ To display status of an Ethernet port:

- At the prompt **config>port>eth**(<port-num>)#, enter **show status**.

  The Ethernet port status parameters are displayed.

For example:

➤ To display the status of Ethernet port 1:

```
ETX-204A# configure port ethernet 1
ETX-204A>config>port>eth(1)# show status
Name                   : ETH 1
Administrative Status  : Up
Operation Status       : Up
Connector Type         : Combo RJ45+SFP Out RJ45 Active
Auto Negotiation       : Other
Speed And Duplex       : 10 Full Duplex
MAC Address            : 00-20-D2-30-CC-9D

EFM Status   : Disabled

ETX-204A>config>port>eth(1)#
```

Testing Ethernet Ports

The physical layer runs at the PHY of the ports. When the loopback is active the data forwarded to a port is looped from the Tx path to the Rx path.

The loopback can be one of the following types:

- Local – Loopback is closed towards the user interface (*Figure 4-2*)
- Remote – Loopback is closed towards the network interface (*Figure 4-3*).

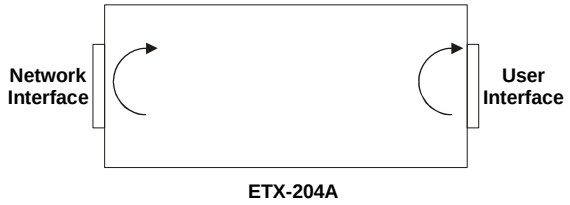


Figure 4-2. Local Loopback

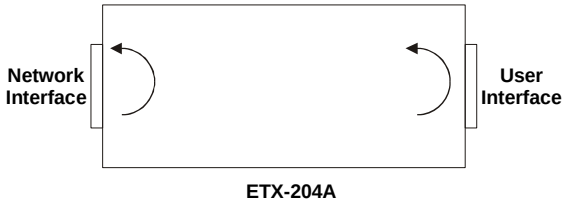


Figure 4-3. Remote Loopback

➤ **To run a physical layer loopback test:**

1. Navigate to **`configure port ethernet`** `<port-num>` to select the Ethernet port to test.

   The **`config>port>eth`**`(<port-num>)#` prompt is displayed.

2. Enter **`loopback`** `{local|remote} [`**`duration`** `<0-3600>]`.

   The duration is in seconds. Entering 0 or not specifying the duration disables the timer, e.g. the loopback runs forever until you disable it.

   While the test is running, entering **`show summary`** at the **`port`** level displays the port's operational status as **`Testing`** (refer to *Displaying Ethernet Port Status*).

3. To end the loopback test, enter **`no loopback`**.

Displaying Ethernet Port Statistics

You can display statistics for the Ethernet ports, as well as L2CP statistics. The sampling interval for the Ethernet port statistics can be configured.

Setting Sampling Interval for Port Statistics

The sampling interval can be configured from one to 30 minutes. The default is 15 minutes.

➤ **To set the sampling interval:**

- At the prompt **`config>port>eth`**`(<port-num>)#`, enter **`rate-sampling-window`** `<1-30>`.

  The sampling interval is set to the specified number of minutes.

Displaying Port Statistics

➤ **To display the Ethernet port statistics:**

- At the prompt **`config>port>eth`**`(<port-num>)#`, enter **`show statistics`**.

  Ethernet port statistics are displayed. The counters are described in *Table 4-3*.

For example:

➤ To display the statistics for Ethernet port 2:

```
ETX-204A# configure port ethernet 2
ETX-204A>config>port>eth(2)# show statistics
Rates Sampling Window
-------------------------------------------------------------
Window Size [Min.]        : 15
Window Remain Time [Min.] : 0

Running
-------------------------------------------------------------
                    Rx                    Tx
Total Frames                : 0                     5257039970304
Total Octets                : 0                     0
Total Frames/Sec            : 0                     0
Total Bits/Sec              : 0                     0
Min. Bits/Sec               : 0                     0
Max. Bits/Sec               : 0                     0
Unicast Frames              : 0                     0
Multicast Frames            : 0                     1224
Broadcast Frames            : 0                     0

Error Frames                : 0                     --
L2CP Discarded              : 0                     --
OAM Discarded               : 0                     --
Unknown Protocol Discarded  : 0                     --
CRC Errors                  : 0                     --
CRC Errors/Sec              : 0                     --
Jabber Errors               : 0                     --
Oversize Frames             : 0                     0

64 Octets                   : 0                     0
65-127 Octets               : 0                     0
128-255 Octets              : 0                     0
256-511 Octets              : 0                     0
512-1023 Octets             : 0                     0
1024-1528 Octets            : 0                     0
1519-2047 Octets            : 0                     0
2048-Max Octets             : 0                     0

ETX-204A>config>port>eth(2)#
```

Table 4-3. Ethernet Statistics Parameters

Parameter	Description
Window Size [Min.]	Interval for sampling statistics, user-configurable (see *Setting Sampling Interval for Port Statistics*)
Window Remain Time [Min.]	Amount of time remaining in statistics sampling window
Total Frames	Total number of frames received/transmitted
Total Octets	Total number of bytes received/transmitted
Total Frames/Sec	Number of frames received/transmitted per second

Parameter	Description
Total Bits/Sec	Number of bits received/transmitted per second
Min. Bits/Sec	Minimum number of bits received/transmitted per second
Max. Bits/Sec	Maximum number of bits received/transmitted per second
Unicast Frames	Total number of unicast frames received/transmitted
Multicast Frames	Total number of multicast frames received/transmitted
Broadcast Frames	Total number of broadcast frames received/transmitted
Error Frames	Total number of frames with errors received
L2CP Discarded	Total number of L2CP frames discarded
OAM Discarded	Total number of OAM frames discarded
Unknown Protocol Discarded	Total number of frames with unknown protocol discarded
CRC Errors	Total number of frames received that are an integral number of octets in length, but do not pass the Frame Check Sequence (FCS) check. This count does not include frames received with Frame-Too-Long or Frame-Too-Short error.
CRC Errors/Sec	Number of frames per second received that are an integral number of octets in length, but do not pass the Frame Check Sequence (FCS) check. This count does not include frames received with Frame-Too-Long or Frame-Too-Short error.
Jabber Errors	Total number of frames received with jabber errors
Oversize Frames	Total number of oversized frames received/transmitted
64 Octets	Total number of received/transmitted 64-byte packets
65–127 Octets	Total number of received/transmitted 65–127-byte packets
128–255 Octets	Total number of received/transmitted 128–255-byte packets
256–511 Octets	Total number of received/transmitted 256–511-byte packets
512–1023 Octets	Total number of received/transmitted 512–1023-byte packets
1024–1528 Octets	Total number of received/transmitted 1024–1528-byte packets
1519–2047 Octets	Total number of received/transmitted 1519–2047-byte packets
2048-Max Octets	Total number of received/transmitted packets with 2048 bytes and up to maximum

Displaying Layer-2 Control Processing Statistics

➤ **To display the Layer-2 control processing statistics for an Ethernet port:**

- At the prompt **`config>port>eth`**(<port-num>)#, enter **`show l2cp-statistics`**.

  L2CP statistics are displayed for the specified port, showing the number of encapsulated and decapsulated packets for each protocol.

For example:

➤ To display the L2CP statistics for Ethernet port 3:

```
ETX-204A# configure port ethernet 3
ETX-204A>config>port>eth(3)# show l2cp-statistics
Protocol            Encapsulated   Decapsulated
-------------------------------------------------------------
STP                 0              0
CDP                 0              0
VTP                 0              0
LLDP                0              0
PVSTP               0              0

Total                0               0
ETX-204A>config>port>eth(3)#
```

Clearing Statistics

➤ To clear the statistics for an Ethernet port:

- At the prompt **config>port>eth**(<port-num>)#, enter **clear-statistics**.

  The statistics for the specified port are cleared.

➤ To clear the L2CP statistics for an Ethernet port:

- At the prompt **config>port>eth**(<port-num>)#, enter **clear-l2cp-statistics**.

  The L2CP statistics for the specified port are cleared.

4.3 Network Interface Redundancy

Two network interfaces operate redundant to each other, either as a single logical link (LAG) or two separate links (1:1).

- Link aggregation (LAG) mode according to IEEE 802.3-2005. In this mode, both ports receive traffic at the same time and one port transmits. If the transmitting port fails, ETX-204A switches to the standby link. Both network ports must be enabled. If activated, LACP control frames are periodically transmitted in order to locate failures as they occur.
- 1:1 bidirectional protection (redundancy) mode. In this mode, only one port is active at a time to carry traffic. If it fails, the second port takes over. The recovery mode (revertive or non-revertive) and the restoration time in revertive mode can be selected according to the application requirements.

Figure 4-4. Link Aggregation between a Switch and ETX-204A

When deciding whether to operate with LAG or protection, you can consider the following if protection without LACP is acceptable in your application:

- Protection – You can configure parameters such as revertive/non-revertive mode, the restoration time in revertive mode, forcing active link, etc., but the switchover time to the standby link is longer than for LAG
- LAG – The switchover time to the standby link is shorter than for protection, but you can't configure the parameters mentioned above.

Link Aggregation

The two Gigabit Ethernet ports can be operated as a single logical interface, using link aggregation in accordance with IEEE 802.3-2005. The two ports must be connected to the same switch/router, as shown in *Figure 4-5*.

The equipment connected to the GbE ports must use compatible switching criteria for redundancy to be available:

- For networks using Layer 2 switching – The criterion is signal loss
- For networks using Layer 3 routing – The router must support IEEE 802.3-2005 or other link aggregation protocol that views the aggregated link as a single logical interface.

Figure 4-5. Network Link Aggregation Redundancy Mode

Using link aggregation inherently provides redundancy, because if one of the GbE ports fails, the other can continue transferring traffic. Failure of a link is detected by sensing the loss of valid signals, or receiving a failure report via Link Aggregation Control Protocol (LACP) if applicable, in which case all traffic is sent through the other link.

1:1 Bidirectional Redundancy

As an alternative to link aggregation, the two ETX-204A network ports can be configured for 1:1 bidirectional mode. With this mode, two topologies can be used:

- Connection of both ports to the same switch/router, as shown in *Figure 4-5*.
- Connection of the ports to different switch/routers, as illustrated in *Figure 4-6*. The main advantage of this topology is its higher availability, because each port can be routed along a different path through the network. This topology is also referred to as dual homing.

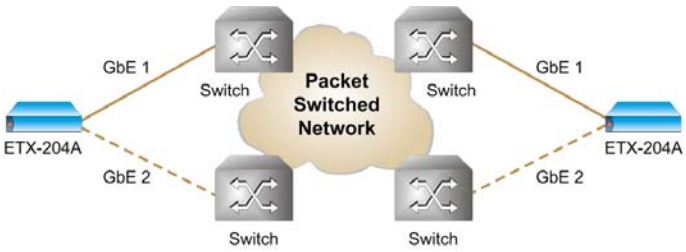


Figure 4-6. 1:1 Bidirectional Redundancy Mode (Dual Homing)

With 1:1 bidirectional redundancy mode, at any time only one of the ports is actively carrying traffic, and the other port serves as the backup port. A RAD proprietary redundancy algorithm, based on loss of GbE signal, is used to detect line failure. The protection switching (flipping) time is less than 1 second. It also depends on the network "relearning" time or aging.

The recovery mode after protection switching can be selected in accordance with the application requirements:

- Non-revertive mode –ETX-204A does not automatically flip back after the failed port returns to normal operation, but only when the currently used port fails, or after a manual flip command.
- Revertive mode –ETX-204A flips back to the original port when it returns to normal operation. Flipping back can be delayed by specifying a restoration time, during which alarms are ignored. As a result, ETX-204A starts evaluating the criteria for protection switching (flipping) only after the restoration time expires, thereby ensuring that another flip cannot occur before the specified time expires.

Configuring LAG

This section explains how to define a link aggregation group (LAG) and enable link aggregation control protocol (LACP). ETX-204A supports one LAG.

Note *In order to enable LACP for the LAG, the ports bound to the LAG must be associated with an L2CP profile that specifies peer action for MAC 0x02.*

➤ **To configure the LAG:**

1. Navigate to **`configure port lag 1`**.

   The **`config>port>lag(1)#`** prompt is displayed.

2. Enter all necessary commands according to the tasks listed below.

Task	Command	Comments
Assigning an admin key to the LAG to indicate the port speed	**`admin-key {giga-ethernet | fast-ethernet}`**	You must define admin key before binding ports to the LAG
Adding a port to the LAG	**`bind {ethernet | giga-ethernet | fast-ethernet}`** `<port-num>`	Using **`no`** before **`bind`** removes a link from the LAG

Task	Command	Comments
Enabling LACP and setting LACP parameters: operation mode (active or passive) and time to wait before sending LACP frames (long or short)	**lacp** [**tx-activity** {**active** | **passive**}] [**tx-speed** {**long** | **short**}]	**tx-activity:** **active** – LAG interface periodically transmits LACP frames (LACPDUs) to all links with LACP enabled **passive** – LAG interface does not initiate the LACP exchange, but replies to received LACPDUs. **tx-speed**: **short** – Three seconds **long**– 90 seconds. Defaults: • If you type **lacp** without specifying **tx-activity**, it is set to **active** • If you type **lacp** without specifying **tx-speed**, it is set to **short**. Typing **no lacp** disables LACP protocol
Assigning value used to build a LAG ID, which determines aggregation precedence. If there are two partner devices competing for the same LAG, LACP compares the LAG IDs for each grouping of ports. The LAG with the lower LAG ID is given precedence and allowed to use the LAG.	**sys-priority <0–65535>**	

Task	Command	Comments
Assigning method of distributing traffic within LAG	**distribution-method** {**src-mac** | **dest-mac** | **src-or-dest-mac** | **src-and-dest-mac** | **src-ip** | **dest-ip** | **src-dest-mac-ip** | **round-robin** | **source-port** | **one-to-one**}	**src-mac** – Packets are distrubuted according to their source MAC addresses **dest-mac** – Packets are distrubuted according to their destination MAC addresses **src-or-dest-mac** – Packets are distrubuted according to their source or destination MAC addresses **src-and-dest-mac** – Packets are distrubuted according to their source and destination MAC addresses **src-ip** – Packets are distrubuted according to their source IP addresses **dest-ip** – Packets are distrubuted according to their destination IP addresses **src-dest-mac-ip** – Packets are distrubuted according to their source and destination MAC an IP addresses **round-robin** – Packets are distrubuted evenly across all of the links **source-port** – Packets are distrubuted according to their source port
Administratively enabling LAG	**no shutdown**	Using **shutdown** disables the LAG
Displaying LAG member status	**show members-status**	
Displaying LAG member statistics	**show members-statistics**	

For example:

➤ **To define LAG 1:**

- L2CP profile mac2peer, with mac0x02 set to peer action
- LAG members – Ethernet ports 1 and 2, with assigned L2CP profile mac2peer
- LACP operation mode – Active
- LACP timeout – Short
- Distribution method – Source port
- System priority – 40,000.

```
ETX-204A#configure port l2cp-profile mac2peer
ETX-204A>config>port>l2cp-profile(mac2peer)$ mac 0x02 peer
ETX-204A>config>port>l2cp-profile(mac2peer)$ exit
ETX-204A>config>port# eth 1 l2cp profile mac2peer
ETX-204A>config>port# eth 2 l2cp profile mac2peer
ETX-204A>config>port# lag 1
ETX-204A>config>port>lag(1)$ admin-key giga-ethernet
ETX-204A>config>port>lag(1)$ bind ethernet 1
ETX-204A>config>port>lag(1)$ bind ethernet 2
ETX-204A>config>port>lag(1)$ lacp tx-activity active tx-speed short
ETX-204A>config>port>lag(1)$ distribution-method source-port
ETX-204A>config>port>lag(1) sys-priority 40000
ETX-204A>config>port>lag(1)$ no shutdown
ETX-204A>config>port>lag(1)$
```

➤ To display the status of the LAG members:

```
ETX-204A#configure port lag 1
ETX-204A>config>port>lag(1)# show members-status
Ports
------------------------------------------------------------
                  Actor                Partner
Port Number     : 1                    0
Collecting      : No                   No
Distributing    : No                   No
Synchronized    : No                   No
System ID       : 0020D230CC9D         000000000000
System Priority                        0
Operational Key : 0                    0
Tx Activity     : Active               Passive
Timeout         : Short                Long
                  Actor                Partner
Port Number     : 2                    0
Collecting      : No                   No
Distributing    : No                   No
Synchronized    : No                   No
System ID       : 0020D230CC9D         000000000000
System Priority                        0
Operational Key : 0                    0
Tx Activity     : Active               Passive
Timeout         : Short                Long
ETX-204A>config>port>lag(1)#
```

➤ To display LAG statistics:

```
ETX-204A#configure port lag 1
ETX-204A>config>port>lag(1)# show members-statistics
LACP
------------------------------------------------------------------------------
Port Number               : 1
Rx LACP Frames            : 0
Rx Marker Frames          : 0
Rx Marker response Frames : 0
Rx Unknown Frames         : 0
Rx Illegal Frames         : 0
Tx LACP Frames            : 1
Tx Marker Frames          : 0
Tx Marker response Frames : 0
Port Number               : 2
Rx LACP Frames            : 0
Rx Marker Frames          : 0
Rx Marker response Frames : 0
Rx Unknown Frames         : 0
Rx Illegal Frames         : 0
Tx LACP Frames            : 1
Tx Marker Frames          : 0
Tx Marker response Frames : 0
ETX-204A>config>port>lag(1)#
```

Configuring Link Protection

Configuring a 1:1 protection requires defining an Ethernet group.

➤ To define an Ethernet group:

- At the Protection context (**config>protection**), enter **ethernet-group** <group id>.

  The system switches to the context of the specified Ethernet group (**config>protection>eth-group**(<group id>)).

➤ To define the operation mode:

- At the Ethernet Group context (**config>protection>eth-group**(<group id>)), enter **oper-mode** {1-to-1|manual}.

➤ To add/remove protection and working ports – in manual mode:

- At the Ethernet Group context (**config>protection>eth-group**(<group id>)), enter **bind ethernet primary** <port>
- To remove protection and working ports, enter **no bind ethernet primary**

➤ To add/remove protection and working ports – in 1–to–1 mode:

- At the Ethernet Group context (**config>protection>eth-group**(<group id>)), enter
  bind ethernet [primary <port>**] [secondary** <port>**]**
- To remove protection and working ports, enter
  no bind ethernet primary
  no bind ethernet secondary

➤ To define the port recovery mode as revertive:

- At the Ethernet Group context (**config>protection>eth-group**(<group id>)), enter
  revertive.

  Traffic is switched back to the primary port after it recovers.

➤ To define the port recovery mode as non-revertive:

- At the Ethernet Group context (**config>protection>eth-group**(<group id>)), enter
  no revertive.

  Traffic continues being transmitted over the secondary port after the primary port recovers.

➤ To define the time between recovery and resumption of transmission

- At the Ethernet Group context (**config>protection>eth-group**(<group id>)), enter
  wait-to-restore <seconds>**.**

  The primary port resumes transmitting traffic once the specified time has been restored and the specified time has elapsed. You can choose between 1 and 720 seconds.

➤ To define the period of time that the failed link stops transmitting to report the failure:

- At the Ethernet Group context (**config>protection>eth-group**(<group id>)), enter
  tx-down-duration-upon-flip <seconds>**.**

  The secondary port resumes transmitting after the specified 'reporting' time. You may specify a time in the range between 0 and 30 seconds. This function is useful if there is no autonegotiation between the link end points.

➤ To force a port to transmit:

- At the EthernetGroup context (**config>protection>eth-group**(<group id>)), enter
  force-active-port ethernet <port>**.**

  The specified port is set to be active. You can choose the primary port (1) or the secondary port (2).

  - Port 1. Port 1 is configured as a permanently active link. Even if port 1 fails, the traffic is not switched to the standby port.

- **Port 2**. Port 2 is configured as a permanently active link. Even if port 2 fails, the traffic is not switched to the standby port.

To specify that neither of the ports is forced to remain active, enter **`no force-active-port`**

➤ **To display the Ethernet group status:**

- At the EthernetGroup context (**`config>protection>eth-group`**(`<group id>`)), enter **`show status`**.

  The Ethernet group status parameters are displayed.

4.4 Quality of Service (QoS)

The ETX-204A Quality of Service (QoS) parameters include the following profiles:

- Queue map profiles
- Marking profiles
- Bandwidth profiles
- Queue block profiles
- Queue group profiles.

These profiles can be applied to the traffic flows to ensure the desired flow prioritization.

Configuring Queue Mapping Profiles

Queue mapping profiles (formerly referred to as CoS profiles) are used to convert the following user priorities into internal priority queues (classes of service). ETX-204A supports up to 12 queue mapping profiles.

- **p-bit**, when the ingress traffic is prioritized according to the 802.1p requirements
- **ip-dscp**, when the ingress traffic is prioritized according to DSCP
- **ip-precedence**, when the ingress traffic is prioritized according to IP precedence.

For each profile, you have to define the queue mapping to map the user priority values to the internal CoS values. The internal queues are combined into a queue profile, which can be assigned to a queue block.

Default Configuration

Default Queue Mapping Profile

ETX-204A provides a default queue mapping profile named CosProfile1, which can be used when the ingress traffic is prioritized according to the 802.1p requirements. It is defined with classification p-bit, and the following mappings:

- Map p-bit 0 to queue 7

- Map p-bit 1 to queue 6
- Map p-bit 2 to queue 5
- Map p-bit 3 to queue 4
- Map p-bit 4 to queue 3
- Map p-bit 5 to queue 2
- Map p-bit 6 to queue 1
- Map p-bit 7 to queue 0.

Default Configuration for IP Precedence Classification

When a new queue mapping profile is created with classification IP precedence, it contains the following mappings:

- Map p-bit 0 to queue 7
- Map p-bit 1 to queue 6
- Map p-bit 2 to queue 5
- Map p-bit 3 to queue 4
- Map p-bit 4 to queue 3
- Map p-bit 5 to queue 2
- Map p-bit 6 to queue 1
- Map p-bit 7 to queue 0.

Default Configuration for DSCP Classification

When a new queue mapping profile is created with classification DSCP, it contains the following mappings:

- Map p-bit 0 to queue 7
- Map p-bit 1 to queue 6
- Map p-bit 2 to queue 5
- Map p-bit 3 to queue 4
- Map p-bit 4 to queue 3
- Map p-bit 5 to queue 2
- Map p-bit 6 to queue 1
- Map p-bit 7 through 63 to queue 0.

Adding Queue Mapping Profiles

When you create a queue mapping profile, you specify the name and the classification method (p-bit, IP precedence, or DSCP).

➤ To add a queue mapping profile:

1. Navigate to **`configure qos`**.

   The **`config>qos#`** prompt is displayed.

2. Type **queue-map-profile** <queue-map-profile-name> **classification** {p-bit|ip-precedence|ip-dscp}.

   A queue mapping profile with the specified name and classification method is created and the following prompt is displayed: **config>qos>queue-map-profile**(<queue-map-profile-name>)**$**. The mappings for the new profile are configured by default as described in *Default Configuration*.

3. Configure the queue profile mappings as described in *Configuring Queue Mappings*.

Configuring Queue Mappings

1. Navigate to **config qos queue-map-profile** <queue-map-profile-name> to select the queue mapping profile to configure.

   The following prompt is displayed: **config>qos>queue-map-profile**(<queue-map-profile-name>)#.

2. Map the user priorities to queue IDs as necessary:

   - Classification p-bit or IP precedence: **map** <0-7> **to-queue** <0-7>
   - Classification DSCP: **map** <0-63> **to-queue** <0-7>.

For example:

➤ To create and configure a queue mapping profile named QMapPbit with classification p-bit:

- Map priority 0 to queue 3
- Map priority 4 and 6 to queue 2.

```
ETX-204A# configure qos queue-map-profile QMapPbit classification p-bit
ETX-204A>config>qos> queue-map-profile(QMapPbit)$ map 0 to 3
ETX-204A>config>qos> queue-map-profile(QMapPbit)$ map 4 to 2
ETX-204A>config>qos> queue-map-profile(QMapPbit)$ map 6 to 2
ETX-204A>config>qos> queue-map-profile(QMapPbit)$ info detail
    map  0 to-queue  3
    map  1 to-queue  6
    map  2 to-queue  5
    map  3 to-queue  4
    map  4..6 to-queue  2
    map  7 to-queue  0
```

➤ To create and configure a queue mapping profile named QMapIPprec with classification IP precedence:

- Map priority 2 and 3 to queue 3.

```
ETX-204A# configure qos queue-map-profile QMapIPprec classif ip-precedence
ETX-204A>config>qos> queue-map-profile(QMapIPprec)$ map 2 to 3
ETX-204A>config>qos> queue-map-profile(QMapIPprec)$ map 3 to 3
ETX-204A>config>qos> queue-map-profile(QMapIPprec)$ info detail
    map  0 to-queue  7
    map  1 to-queue  6
    map  2..4 to-queue  3
    map  5 to-queue  2
    map  6 to-queue  1
    map  7 to-queue  0
```

➤ To create and configure a queue mapping profile named QMapDSCP with classification DSCP:

- Map priority 7 to queue 6
- Map priority 55 to queue 4
- Map priority 63 to queue 5.

```
ETX-204A# configure qos queue-map-profile QMapDSCP classif ip-dscp
ETX-204A>config>qos> queue-map-profile(QMapDSCP)$ map 7 to 6
ETX-204A>config>qos> queue-map-profile(QMapDSCP)$ map 55 to 4
ETX-204A>config>qos> queue-map-profile(QMapDSCP)$ map 63 to 5
ETX-204A>config>qos> queue-map-profile(QMapDSCP)$ info detail
    map  0 to-queue  7
    map  1 to-queue  6
    map  2 to-queue  5
    map  3 to-queue  4
    map  4 to-queue  3
    map  5 to-queue  2
    map  6 to-queue  1
    map  7 to-queue  6
    map  8..54 to-queue  0
    map  55 to-queue  4
    map  56..62 to-queue  0
    map  63 to-queue  5
```

Configuring Marking Profiles

Marking profiles map the P-bit, IP precedence, or DSCP classifications to the egress priority tags. The marking can also be done per color (green and/or yellow), to support color re-marking. ETX-204A supports up to 12 marking profiles, with up to four color-aware profiles.

➤ To define a non color-aware marking profile and assign a priority mark to it:

1. Navigate to the qos context (**`config>qos`**).
2. Define a marking profile and assign a classification and a method to it:

```
marking-profile <marking-profile-name>
[classification {p-bit|ip-precedence|ip-dscp|tos}
[method p-bit]
```

3. Map the user priority to a priority marking value (0–7 for p-bit and IP precedence, 0–63 for the other priority types):

```
mark <0-7> to <0-7>
mark <0-63> to <0-7>.
```

➤ To define a color-aware marking profile and assign a priority mark to it:

1. Navigate to the qos context (**config>qos**).
2. Define a color-aware marking profile and assign a classification and a method to it:

```
marking-profile <marking-profile-name>
[classification {p-bit|ip-precedence|ip-dscp} [method p-bit]
color-aware green-yellow
```

3. Map the packet color and user priority to a priority marking value (0–7 for p-bit and IP precedence, 0–63 for the other priority types):

```
mark <0-7> {all|green|yellow}to <0-7>
mark <0-63> {all|green|yellow}to <0-63>.
```

Note *If DSCP classification is used, then only up to eight green-yellow combinations are available. A green-yellow combination consists of all the priorities that mark to a particular value for green, and to a particular value for yellow. For example, this is a combination that marks to 1 for green and 2 for yellow:*
mark 2 green to 1
mark 2 yellow to 2
mark 3 green to 1
mark 3 yellow to 2
mark 4 green to 1
mark 4 yellow to 2
mark 5 green to 1
mark 5 yellow to 2

This is a combination that marks to 0 for green and for yellow, as output by info command:
mark 0..11 green to 0
mark 13..63 green to 0
mark 0..19 yellow to 0
mark 21..63 yellow to 0

ETX-204A provides a default marking profile named MarkingProfile1, which can be used when the ingress traffic is prioritized according to the 802.1p requirements. It is defined with classification p-bit and method p-bit, and the following markings:

- P-bit 0 => priority 0
- P-bit 1 =>priority 1
- P-bit 2 =>priority 2
- P-bit 3 =>priority 3

- P-bit 4 =>priority 4
- P-bit =>priority 5
- P-bit =>priority 6
- P-bit =>priority 7.

Configuring Bandwidth Profiles

ETX-204A supports the following bandwidth profiles:

- Shaper profile – Applied to queue group blocks
- Policer profile – Applied to flows
- Policer aggregate – Specifies policer profile to apply to a group of up to five traffic flows.

Note *You cannot assign the same name to a shaper profile and a policer profile.*

You can control the egress bandwidth utilization by defining the committed information rate and committed burst size in shaper and policer profiles. You can also define the excessive information rate and the excessive burst size in policer profiles.

CIR: Defines the Committed Information Rate (CIR) for the current profile. The CIR specifies a bandwidth with committed service guarantee ("green bucket" rate).

CBS: Defines the Committed Burst Size (CBS) for the current profile. The CBS specifies the maximum guaranteed burst size ("green bucket" size).

EIR: Defines the Excess Information Rate (EIR). The EIR specifies an extra bandwidth with no service guarantee ("yellow bucket" rate).

EBS: Defines the Excess Burst Size (EBS). The EBS specifies the extra burst with no service guarantee ("yellow bucket" size).

Compensation: You can specify the amount of bytes that the shaper or policer can compensate for the layer 1 overhead (preamble and IFG) and the overhead for the added VLAN header in case of stacking.

Default Bandwidth Profiles

ETX-204A provides default bandwidth profiles, as specified in the following table.

Table 4-4. Default Bandwidth Profiles

Profile Type	Shaper	Policer
Profile Name	Shaper1	Policer1
cir	1,000,000	0
cbs	32,767	0
eir	–	1,000,000
ebs	–	32,767
compensation	0	0

Profile Type	Shaper	Policer
traffic-type	–	all

Configuring Shaper Profiles

You can define up to 30 shaper profiles.

Adding Shaper Profiles

1. Navigate to **`configure qos`**.

   The **`config>qos#`** prompt is displayed.

2. Type **`shaper-profile`** `<shaper-profile-name>`.

   A shaper profile with the specified name is created and the **`config>qos>shaper-profile`**`(<shaper-profile-name>)`**`$`** prompt is displayed. The new shaper profile parameters (except for name) are configured by default as described in *Default Bandwidth Profiles*.

3. Configure the shaper profile as described in *Configuring Shaper Profile Parameters*.

Configuring Shaper Profile Parameters

➤ To configure shaper profiles:

1. Navigate to **`configure qos shaper-profile`** `<shaper-profile-name>` to select the shaper profile to configure.

   The **`config>qos>shaper-profile`**`(<shaper-profile-name>)#` prompt is displayed.

2. Enter all necessary commands according to the tasks listed below.

Task	Command	Comments
Specifying the CIR (kbps) and CBS (bytes) bandwidth limits ***Note**: The CIR granularity is 128 kbps. If you specify a CIR that is not a multiple of 128 kbps, the device rounds it down, for example if you specify 260 kbps then the device operates as if you specified 256 kpbs.*	**`bandwidth cir`** `<0–100000>` **`cbs`** `<0–32767>`	Typing **`no bandwidth`** removes the bandwidth limits
Specifying the compensation (bytes)	**`compensation`** `<0–63>`	

For example:

➤ To create and configure a shaper profile named Shap2:

- CIR = 99,968 Kbps
- CBS = 32,000 bytes
- Compensation = 48.

```
ETX-204A# configure qos shaper-profile Shap2
ETX-204A>config>qos>shaper-profile(Shap2)$ bandwidth cir 99968 cbs 32000
ETX-204A>config>qos>shaper-profile(Shap2)$ compensation 48
ETX-204A>config>qos>shaper-profile(Shap2)$
```

Configuring Policer Profiles

You can define up to 60 policer profiles, except if at least one policer profile has total CIR + EIR greater than 133 Mbps, then no more than 16 policer profiles can be defined.

Adding Policer Profiles

1. Navigate to **`configure qos`**.

   The **`config>qos#`** prompt is displayed.

2. Type **`policer-profile`** `<policer-profile-name>`.

   A policer profile with the specified name is created and the following prompt is displayed:
   `config>qos>policer-profile``(<policer-profile-name>)`**`$`**.

   The new policer profile parameters (except for name) are configured by default as described in *Default Bandwidth Profiles*.

3. Configure the policer profile as described in *Configuring Policer Profile Parameters*.

Configuring Policer Profile Parameters

1. Navigate to **`configure qos policer-profile`** `<policer-profile-name>` to select the policer profile to configure.

   The **`config>qos>policer-profile`**`(<policer-profile-name>)#` prompt is displayed.

2. Enter all necessary commands according to the tasks listed below.

Task	Command	Comments
Specifying the CIR (kbps), CBS (bytes), EIR (kbps), and EBS (bytes) bandwidth limits ***Notes**:* • *The CIR+EIR granularity is 32 kbps up to 130 Mbps, and 512 kbps up to 1 Gbps. If the sum of CIR and EIR does not fit this granularity, the device rounds down. You can use **`info detail`** to see the rounded-down values.* • *The CBS should be greater than the maximum frame size.*	**`bandwidth cir`** `<0–1000000>` **`cbs`** `<0–32767>` **`eir`** `<0–1000000>` **`ebs`** `<0–32767>`	Typing **`no bandwidth`** removes the bandwidth limits
Specifying the compensation (bytes)	**`compensation`** `<0–63>`	
Specifying the traffic type	**`traffic-type all`**	•

For example:

➤ **To create and configure a policer profile named Policer4:**

- CIR = 80,000 Kbps
- CBS = 28,000 bytes
- EIR = 90,000
- EBS = 20,000 bytes
- Compensation = 56.

Note *The EIR 90,000 is rounded by the device as shown below in the* ***info detail*** *output, due to the granularity of 512 kbps when the CIR + EIR is greater than 130 Mbps.*

```
ETX-204A# configure qos policer-profile Policer4
ETX-204A>config>qos>policer-profile(Policer4)$ bandwidth cir 80000 cbs 28000
eir 90000 ebs 20000
ETX-204A>config>qos>policer-profile(Policer4)$ compensation 56
ETX-204A>config>qos>policer-profile(Policer4)$ info detail
    bandwidth cir  80000 cbs  28000 eir  89984 ebs  20000
    traffic-type  all
    compensation  56
ETX-204A>config>qos>policer-profile(Policer4)$
```

Configuring Policer Aggregates

You can define up to 30 policer aggregates that specify a policer profile to apply to a group of up to five flows. This is useful if you want to set bandwidth limits that are divided among more than one flow.

Default Configuration

When a policer aggregate is created, it has the following configuration:

- No assigned policer profile
- No assigned flows
- Rate sampling window (interval for sampling the associated flow statistics) set to 15 minutes.

Adding Policer Aggregates

1. Navigate to **`configure qos`**.

   The **`config>qos#`** prompt is displayed.

2. Type **`policer-aggregate`** `<policer-aggregate-name>`.

   A policer aggregate with the specified name is created and the **`config>qos>policer-aggregate`**`(<policer-aggregate-name>)`**`$`** prompt is displayed. The new policer aggregate parameters are configured by default as described in *Default Configuration*.

3. Configure the policer aggregate as described in *Configuring Policer Aggregate Parameters*.

Configuring Policer Aggregate Parameters

1. Navigate to **`configure qos policer-aggregate`** `<policer-aggregate-name>` to select the policer aggregate to configure.

   The following prompt is displayed:
   `config>qos>policer-aggregate``(<policer-aggregate-name>)#`.

2. Enter all necessary commands according to the tasks listed below.

Note *You assign the flows to the policer aggregate in the flow level (refer to* Configuring Flows *for details).*

Task	Command	Comments
Assigning policer profile	**`policer profile`** `<policer-profile-name>`	
Specifying rate sampling window (minutes)	**`rate-sampling-window`** `<1–30>`	
Displaying the associated flows	**`show flows`**	
Displaying statistics for the associated flows	**`show statistics running`**	
Clearing the statistics for the associated flows	**`clear-statistics`**	

Configuring Queue Block Profiles

In order to facilitate congestion management, you can sort traffic by applying queue block profiles to queue block entities. A queue block profile contains entries for queues 0–7, with the following parameters:

- Scheduling method:
  - Strict – High-priority queues that are always serviced first. If a lower-priority queue is being serviced and a packet enters a higher queue, that queue is serviced immediately.
  - WFQ (weighted fair queuing) – If one port does not transmit, its unused bandwidth is shared by the 'transmitting' queues according to the assigned weight.

  In configurations with Strict and WFQ queues, the WFQ frames are transmitted only after the transmission of frames associated with the Strict queues is completed.

Note *If one of the internal queues is configured to WFQ, queues with a higher queue ID cannot be configured to Strict.*

- Depth (queue length), in bytes.

Note *A queue block has 1 MB available, therefore the sum of the depths of its eight queues must be no greater than 1 MB.*

Default Queue Block Profile

ETX-204A provides a default queue block profile named DefaultQueue1, which defines queues 0–7 as follows:

- Scheduling method: WFQ, with weight set to 100
- Depth: 50,000.

Adding Queue Block Profiles

You can define up to 32 queue block profiles.

➤ **To add a queue block profile:**

1. Navigate to **`configure qos`**.

   The **`config>qos#`** prompt is displayed.

2. Type **`queue-block-profile`** `<q-blk-profile-name>`.

   A queue block profile with the specified name is created and the **`config>qos>queue-block-profile`**`(<q-blk-profile-name>)`**`$`** prompt is displayed. The queues for the new profile are configured by default as described in *Default Queue Block Profile*.

3. Configure the queue block profile as described in *Configuring Queue Block Profile Parameters*.

Configuring Queue Block Profile Parameters

➤ **To configure a queue block profile:**

1. Navigate to **`config qos queue-block-profile`** `<q-blk-profile-name>` to select the queue block profile to configure.

   The **`config>qos>queue-block-profile`**`(<q-blk-profile-name>)#` prompt is displayed.

2. Perform the following for each queue that you wish to configure:

   a. To configure a queue, enter **`queue <`**`q-ID>`.

   The following prompt is displayed:
`config>qos>queue-block-profile``(<q-blk-profile-name>)`**`>queue`**`(<q-ID>)#`.

   b. Enter all necessary commands according to the tasks listed below.

   c. Type **`exit`** to return to the queue block profile context.

Task	Command	Comments
Setting scheduling method	**`scheduling`** { **`strict`** | **`wfq`** `<weight>}`	The weight range is 3–110
Specifying queue depth (in bytes)	**`depth`** `<0–1048576>`	

For example:

➤ **To create and configure a queue block profile named QBlockProf1:**

- Queue 0 set to strict scheduling and depth 500,000
- Queue 1 set to strict scheduling and depth 200,000

- Queue 7 set to WFQ scheduling with weight 75.

```
ETX-204A# configure qos queue-block-profile QBlockProf1
ETX-204A>config>qos>queue-block-profile(QBlockProf1)$ queue 0
ETX-204A>config>qos>queue-block-profile(QBlockProf1)>queue(0)$ scheduling strict
ETX-204A>config>qos>queue-block-profile(QBlockProf1)>queue(0)$ depth 500000
ETX-204A>config>qos>queue-block-profile(QBlockProf1)>queue(0)$ exit
ETX-204A>config>qos>queue-block-profile(QBlockProf1)# queue 1
ETX-204A>config>qos>queue-block-profile(QBlockProf1)>queue(1)# scheduling strict
ETX-204A>config>qos>queue-block-profile(QBlockProf1)>queue(1)# depth 200000
ETX-204A>config>qos>queue-block-profile(QBlockProf1)>queue(1)# exit
ETX-204A>config>qos>queue-block-profile(QBlockProf1)# queue 7
ETX-204A>config>qos>queue-block-profile(QBlockProf1)>queue(7)# scheduling wfq 75
ETX-204A>config>qos>queue-block-profile(QBlockProf1)>queue(7)#
```

Configuring Queue Group Profiles

In order to facilitate congestion management, you can sort traffic by applying one queue group profile per network or user port. You can define up to eight queue group profiles per ETX-204A unit.

Adding Queue Group Profiles

➤ To add a queue group profile:

1. Navigate to **`configure qos`**.

   The **`config>qos#`** prompt is displayed.

2. Type **`queue-group-profile`** `<q-grp-profile-name>`.

   A queue group profile with the specified name is created and the **`config>qos>queue-group-profile`**`(<q-grp-profile-name>)`**`$`** prompt is displayed.

3. Configure the queue group profile as described in *Configuring Queue Group Profile Parameters*.

Configuring Queue Group Profile Parameters

➤ To configure a queue group profile:

1. Navigate to **`config qos queue-group-profile`** `<q-grp-profile-name>` to select the queue group profile to configure.

   The **`config>qos>queue-group-profile`**`(<q-grp-profile-name>)#` prompt is displayed.

2. Select a queue block in level 0 or 1 to configure:
   `queue-block` `0/<1-31>`
   `queue-block` `1/1`

   The following prompt is displayed:
`config>qos>queue-group-profile``(<q-grp-profile-name>)`**`>queue-block`**`(<level/ID>)#`.

3. Enter all necessary commands according to the tasks listed below.
4. If you wish to configure another queue block, type **exit** to return to the queue group profile context, and start again at *step 2*.

Task	Command	Comments
Assigning a name to the queue block	**name** <name>	
Assigning a queue block profile ***Note**: Only for queue blocks in level 0*	**profile <**queue-block-profile-name>	
Assigning a shaper profile ***Note**: Only for queue blocks in level 0*	**shaper profile** <shaper-profile-name>	

Note

Normally there is no need for you to enter the bind command. When you add a queue block in level 0 to the profile, bind is done automatically.

You cannot use the bind command if the queue group contains a single queue block in level 0.

Configuring WRED Profiles

The WRED mechanism defines the probability of dropping yellow packets depending on the current queue usage. This avoids traffic congestion and ensures the forwarding of green packets. You can configure the following:

- Minimum threshold – Defines the queue usage at which the WRED mechanism starts to drop yellow packets
- Maximum threshold – Defines the queue usage above which the WRED mechanism drops all yellow packets
- Probability –Determines the percentage of packets to be dropped when the queue usage reaches the maximum threshold

There are eight WRED profiles available, named WREDProfile0 through WREDProfile7. They are bound to the queues automatically: WREDProfile0 is bound to queue 0, WREDProfile1 is bound to queue 1, etc. You cannot delete the WRED profiles, and you cannot add more WRED profiles. The binding of the profiles to the queues is set and cannot be changed, but you can change the profile parameters. You can view the assignment of WRED profiles to queues via the **info** command.

Note

The WRED mechanism is activated only when you use a policer profile with EIR set to a nonzero value.

➤ To configure WRED profiles:

1. Navigate to **configure qos** and type **wred-profile** WREDProfile<n> where n is 0 through 7.

   The **config>qos>wred-profile(**WREDProfile<n>)# prompt is displayed.

2. Enter:
   color yellow min <min-threshold> **max** <max-threshold> [**probability** <max-probability>].
   - min-threshold –Queue usage minimum threshold in percentage, 0–100
   - max-threshold –Queue usage maximum threshold in percentage, 0–100
   - max-probability – Percentage of packets to be dropped when the queue usage reaches the maximimum limit.

Note *You can configure the parameters for the color yellow only.*

4.5 Flows

ETX-204A supports up to 270 unidirectional Ethernet flows, which can be used to provide E-line or E-LAN service delivery over Metro Ethernet networks. Each Ethernet flow is unidirectional and connects two ports.

This section explains how to define the flows according to specific criteria such as VLAN. You can use classifier profiles to specify the criteria for flows. The classification is per port and is applied to the ingress port of the flow.

Classifications that apply to the same port are allowed in the combinations shown in *Table 4-5*. The priority shown is used to determine which classification is used if incoming packets for the port fit the criteria of more than one classification. Priority 4 is the lowest, priority 1 is the highest. NNI indicates ingress network port, UNI indicates ingress user port.

You can perform marking and tagging actions on the outer and inner VLAN such as adding, replacing, or removing, as well as marking with p-bit. Only certain combinations of actions on the outer and inner VLAN are allowed. If no action is performed for the outer VLAN, then for the inner VLAN there must be no action performed. *Table 4-6* shows valid action combinations on ingress frame tags and the resulting egress frame tags and p-bits, according to whether the ingress frame is untagged, contains one VLAN, or is double-tagged. Any combination not shown in the table is not supported.

In the descriptions, VLAN refers to the service provider (outer) VLAN, previously referred to as SP-VLAN, while inner VLAN refers to the Customer Entity VLAN, previously referred to as CE-VLAN.

Table 4-5. Classification Combinations

Classification	Other classifications allowed on same ingress port	Range	Max number ranges	Priority	NNI/UNI
Unclassified (all-to-one bundling)	VLAN VLAN + IP precedence VLAN + DSCP VLAN + VLAN priority VLAN + Non-IP VLAN priority IP precedence DSCP Source MAC address Destination MAC address Source IP address Destination IP address Non-IP Ethertype Untagged	–	1	4	Both
VLAN *See Note 1*	VLAN + VLAN priority VLAN + IP precedence VLAN + DSCP VLAN + source MAC address VLAN + destination MAC address VLAN + source IP address VLAN + destination IP address VLAN + inner VLAN VLAN + VLAN priority + inner VLAN VLAN + Ethertype Source MAC address Destination MAC address Source IP address Destination IP address Ethertype Unclassified Untagged	0–4094	5	3	Both
VLAN + VLAN priority *See Note 1*	VLAN VLAN + source MAC address VLAN + destination MAC address VLAN + source IP address VLAN + destination IP address VLAN + inner VLAN VLAN + Ethertype Source MAC address Destination MAC address Source IP address Destination IP address Unclassified Ethertype Untagged	0–4094 + 0–7	5	2	Both

Classification	Other classifications allowed on same ingress port	Range	Max number ranges	Priority	NNI/UNI
VLAN + IP precedence	VLAN Source MAC address Destination MAC address Source IP address Destination IP address Unclassified Ethertype Non-IP Untagged	0–4094 + 0–7	5	2	Both
VLAN + DSCP	VLAN Source MAC address Destination MAC address Source IP address Destination IP address Unclassified Ethertype Non-IP Untagged	0–4094 + 0–63	5	2	Both
VLAN + source MAC address	VLAN VLAN + VLAN priority VLAN + inner VLAN VLAN + VLAN priority + inner VLAN	0–4094 + MAC address	One VLAN value + one MAC value (range not allowed for MAC)	2	Both
VLAN + destination MAC address	VLAN VLAN + VLAN priority VLAN + inner VLAN VLAN + VLAN priority + inner VLAN	0–4094 + MAC address	One VLAN value + one MAC value (range not allowed for MAC)	2	Both
VLAN + source IP address	VLAN VLAN + VLAN priority VLAN + inner VLAN VLAN + inner VLAN + VLAN priority	0–4094 + IP address	One VLAN value + one IP address value (range not allowed for IP address)	2	Both
VLAN + destination IP address	VLAN VLAN + VLAN priority VLAN + inner VLAN VLAN + inner VLAN + VLAN priority	0–4094 + IP address	One VLAN value + one IP address value (range not allowed for IP address)	2	Both

Classification	Other classifications allowed on same ingress port	Range	Max number ranges	Priority	NNI/UNI
VLAN + inner VLAN	VLAN VLAN + VLAN priority VLAN + VLAN priority + inner VLAN VLAN + source MAC address VLAN + destination MAC address VLAN + source IP address VLAN + destination IP address VLAN + Ethertype	Single value for VLAN and range for inner VLAN	5 (for inner range)	3	Both
VLAN + VLAN priority + inner VLAN	VLAN VLAN + inner VLAN VLAN + source MAC address VLAN + destination MAC address VLAN + source IP address VLAN + destination IP address VLAN + Ethertype	Single value for VLAN and range for inner VLAN	5 (for inner range)	3	Both
VLAN + non-IP	Unclassified VLAN VLAN + IP precedence VLAN + DSCP Source MAC address Destination MAC address Source IP address Destination IP address Ethertype Untagged	0–4094	5	1	Both
VLAN + Ethertype	VLAN VLAN + VLAN priority VLAN +inner VLAN VLAN + inner VLAN + VLAN priority	Ethertype + 0–4094	One Ethertype value with one VLAN value	2	Both
VLAN priority	Unclassified Source MAC address Destination MAC address Source IP address Destination IP address Ethertype Untagged	0–7	5	2	Both
IP precedence	Unclassified Source MAC address Destination MAC address Source IP address Destination IP address Non-IP Ethertype	0–7	5	2	Both

Classification	Other classifications allowed on same ingress port	Range	Max number ranges	Priority	NNI/UNI
DSCP	Unclassified Source MAC address Destination MAC address Source IP address Destination IP address Non-IP Ethertype	0–63	5	2	Both
Source MAC address	VLAN VLAN priority VLAN + VLAN priority VLAN + IP precedence VLAN + DSCP VLAN + Non-IP IP precedence DSCP Unclassified Non-IP Untagged	MAC address	Single value (range not allowed)	1	Both
Destination MAC address	VLAN VLAN priority VLAN + VLAN priority VLAN + IP precedence VLAN + DSCP VLAN + Non-IP IP precedence DSCP Unclassified Non-IP Untagged	MAC address	Single value (range not allowed)	1	Both
Source IP address	VLAN VLAN priority VLAN + VLAN priority VLAN + IP precedence VLAN + DSCP VLAN + Non-IP IP precedence DSCP Unclassified Non-IP Untagged	IP address	Single value (range not allowed)	1	Both

Classification	Other classifications allowed on same ingress port	Range	Max number ranges	Priority	NNI/UNI
Destination IP address	VLAN VLAN priority VLAN + VLAN priority VLAN + IP precedence VLAN + DSCP VLAN + Non-IP IP precedence DSCP Unclassified Non-IP Untagged	IP address	Single value (range not allowed)	1	Both
Non-IP	Unclassified VLAN + IP precedence VLAN + DSCP Source MAC address Destination MAC address Source IP address Destination IP address Ethertype	–	1	1	Both
Ethertype	Unclassified VLAN VLAN priority VLAN + VLAN priority VLAN + IP precedence VLAN + DSCP VLAN + non-IP IP precedence DSCP Non-IP Untagged	1	1	1	Both
Untagged	Unclassified VLAN VLAN priority VLAN + VLAN priority Source MAC address Destination MAC address Source IP address Destination IP address Ethertype	–	1	2	Both

Note 1 *If you combine the classifications VLAN and VLAN + VLAN priority, the VLANs must be different.*

For example, the following combination is not allowed:

- *VLAN 100*
- *VLAN 100 + p-bit 5.*

The following combination is allowed:

- *VLAN 100*
- *VLAN 200 + p-bit 5.*

You can achieve the combination VLAN 100 and VLAN 100 + p-bit 5 via the following:

- *VLAN 100 + p-bit 0–4, 6–7*
- *VLAN 100 + p-bit 5.*

Table 4-6. Valid VLAN Action Combinations

Action on:		Egress VLAN(s) and P-bit(s) for Ingress Frame Types:		
Outer VLAN	Inner VLAN	Untagged	One VLAN (X)	Double VLANs (X and Y)
None	None	Untagged	X	X, Y
Pop	None	Not applicable – unsupported	Untagged	Y
Pop	Mark with VLAN A	Not applicable – unsupported	Not applicable – unsupported	A
Pop	Pop	Not applicable – unsupported	Not applicable – unsupported	Untagged
Push VLAN A	None	A	A, X	A, X, Y
Push VLAN A	Mark with VLAN B	A	A, B	A, B, Y
Push VLAN A	Mark with p-bit D	A	A X + p-bit D	A, X + p-bit D, Y
Push VLAN A	Mark with profile F *See Note 1*	A	A, X + p-bit according to F	A, X + p-bit according to F, Y
Push VLAN A. mark with profile E	Push VLAN B, mark with p-bit D	A + p-bit according to E, B + p-bit D	A + p-bit according to E, B + p-bit D, X	A + p-bit according to E, B + p-bit D, X, Y
Push VLAN A. mark with p-bit C	Push VLAN B, mark with p-bit D	A + p-bit C, B + p-bit D	A + p-bit C, B + p-bit D, X	A + p-bit C, B + p-bit D, X, Y

Action on:		Egress VLAN(s) and P-bit(s) for Ingress Frame Types:		
Outer VLAN	Inner VLAN	Untagged	One VLAN (X)	Double VLANs (X and Y)
Push VLAN A. mark with profile E	Push VLAN B. mark with profile F *See Note 1*	A + p-bit according to E, B + p-bit according to F	A + p-bit according to E, B + p-bit according to F, X	A + p-bit according to E, B + p-bit according to F, X, Y
Push VLAN A. mark with p-bit C	Push VLAN B. mark with profile F *See Note 1*	A + p-bit C, B + p-bit according to F	A + p-bit C, B + p-bit according to F, X	A + p-bit C, B + p-bit according to F, X, Y
Mark with VLAN A	None	Untagged	A	A, Y
Mark with VLAN A	Mark with p-bit D	Not applicable – unsupported	Not applicable – unsupported	A, Y + p-bit D
Mark with p-bit C	Mark with p-bit D	Not applicable – unsupported	Not applicable – unsupported	X+ p-bit C, Y + p-bit D
Mark with VLAN A + p-bit	Mark with p-bit D	Not applicable – unsupported	Not applicable – unsupported	A + p-bit, Y + p-bit D
Mark with VLAN A + profile E	Mark with VLAN B +p-bit D	Not applicable – unsupported	Not applicable – unsupported	A + p-bit according to E, B +p-bit D

Note 1: *When an inner marking profile is used, it is applied to the outer p-bits.*

Defining Classifier Profiles

You can define up to 64 classifier profiles to apply to flows to ensure the desired flow classification.

➤ **To define a classifier profile:**

1. Navigate to the flows context (**config>flows**).
2. Define a classifier profile and assign a name to it:

   classifier-profile <profile-name> **match-any**

   The system switches to the context of the classifier profile (**config>flows>classifier-profile(**<profile-name>)).
3. Specify the criteria for the classifier profile:

```
[no] match [ vlan <X>..<Y> ] [ inner-vlan <X>..<Y> ]
[ p-bit <X>..<Y> ] [ inner-p-bit <X>..<Y> ]
[ ip-precedence <X>..<Y> ] [ ip-dscp <X>..<Y> ] [tos <X>..<Y>]
[src-mac <src-mac-low>] [to-src-mac <src-mac-high>]
[dst-mac <dst-mac-low>] [to-dst-mac <dst-mac-high>]
[src-ip <src-ip-low>] [to-src-ip <src-ip-high>]
```

```
[dst-ip <dst-ip-low>] [to-dst-ip <dst-ip-high>]
[ether-type <0xhhhh>] [untagged] [non-ip] [all]
```

Examples:

Specify VLAN 100 to VLAN 150: **match vlan 100..150**

Specify VLAN 20 and inner VLAN 30: **match vlan 20 inner-vlan 30**

Specify unclassified: **match all**

Specify Ethertype 0x8912: **match ether-type 0x8912**

4. When you have completed specifying the criteria, enter **exit** to exit the classifier profile context.

Configuring Flows

➤ To create a flow:

1. Navigate to the flows context (**config>flows**).
2. Define a flow and assign a name to it:

   flow <flow-name>

   The system switches to the respective flow context (**config>flows>flow(**<flow-name>))
3. Associate the flow with a classifier profile:

   classifier <classifier-profile-name>

   Up to three flows can be associated with one classifier profile.
4. Associate the flow with a policer profile or policer aggregate:

   policer profile <policer-profile-name>

   policer aggregate <policer-aggregate-name>

   Up to five flows can be associated with one policer aggregate.
5. Specify the ingress port as the host port or an Ethernet port:

   ingress-port host

   ingress-port ethernet <port>
6. Specify the egress port as the host port or an Ethernet port, and define its queues:

   egress-port host [queue <queue-id>]

   egress-port host [queue-map-profile <profile-name>]

   egress-port ethernet <port> [queue <queue-id> block <block-id>]

   egress-port ethernet <port> [queue-map-profile <profile-name> block < block-id>]

Note *If a queue mapping profile is used, it must be compatible with the classification criteria of the flow, e.g. if the classification is according to DSCP then the queue mapping should not be according to p-bit.*

7. Define marking actions for the flow such as overwriting the VLAN ID or inner VLAN ID or setting the priority:
   a. Enter the marking context:

      mark all

   b. Specify marking actions. You can perform the following actions:
      - Overwrite VLAN ID with a new value:

        vlan <vlan-value>
      - Overwrite inner VLAN ID with a new value:

        inner-vlan <inner-vlan-value>
      - Specify p-bit to set priority for outer VLAN of flow:

        p-bit <p-bit-value>
      - Specify marking profile to set priority for outer VLAN of flow:

        marking-profile <marking-profile-name>
      - Specify p-bit to set priority for inner VLAN of flow:

        inner-p-bit <inner-p-bit-value >
      - Specify marking profile for inner VLAN of flow:

        inner-marking-profile <inner-marking-profile-name>.

Note *If a marking profile is used, it must be compatible with the classification criteria of the flow, e.g. if the flow classification is according to DSCP then the marking classification should not be according to p-bit.*

If a color-aware marking profile is applied for the outer VLAN of a flow, then if marking is applied to the inner VLAN, either the same color-aware marking profile must be used for the inner VLAN, or a non-color-aware marking profile must be used for the inner VLAN.

   c. Exit the marking context and return to the flow context:

      exit

8. Specify VLAN tag actions (removing or adding VLAN IDs with p-bit values) for the flow. You can perform the following actions:
   - Add VLAN ID with p-bit set to specific value, and optionally add inner VLAN ID with p-bit set to specific value:

     vlan-tag push vlan <sp-vlan> **p-bit fixed** <fixed-p-bit>
     [**inner-vlan** <inner-sp-vlan>
     p-bit fixed <inner-fixed-p-bit>]
   - Add VLAN ID with p-bit set to specific value, and optionally add inner VLAN ID with p-bit set via marking profile:

     vlan-tag push vlan <sp-vlan> p-bit fixed <fixed-p-bit>
     [**inner-vlan** <inner-sp-vlan>
     p-bit profile <inner-marking-profile-name>]
   - Add VLAN ID with p-bit set to specific value, and optionally add inner VLAN ID with p-bit set by copying from the incoming frame:

```
vlan-tag push vlan <sp-vlan> p-bit fixed <fixed-p-bit>
[inner-vlan <inner-sp-vlan> p-bit copy]
```

- Add VLAN ID with p-bit set via marking profile, and optionally add inner VLAN ID with p-bit set to specific value:

```
vlan-tag push vlan <sp-vlan>
p-bit profile <marking-profile-name>
[inner-vlan <inner-sp-vlan>
p-bit fixed <inner-fixed-p-bit>]
```

- Add VLAN ID with p-bit set via marking profile, and optionally add inner VLAN ID with p-bit set via marking profile:

```
vlan-tag push vlan <sp-vlan>
p-bit profile <marking-profile-name>
[inner-vlan <inner-sp-vlan>
p-bit profile <inner-marking-profile-name>]
```

- Add VLAN ID with p-bit set via marking profile, and optionally add inner VLAN ID with p-bit set by copying from the incoming frame:

```
vlan-tag push vlan <sp-vlan>
p-bit profile <marking-profile-name>
[inner-vlan <inner-sp-vlan> p-bit copy]
```

- Add VLAN ID with p-bit set by copying from the incoming frame, and optionally add inner VLAN ID with p-bit set to specific value:

```
vlan-tag push vlan <sp-vlan> p-bit copy
[inner-vlan <inner-sp-vlan>
p-bit fixed <inner-fixed-p-bit>]
```

- Add VLAN ID with p-bit set by copying from the incoming frame, and optionally add inner VLAN ID with p-bit set via marking profile:

```
vlan-tag push vlan <sp-vlan> p-bit copy
[inner-vlan <inner-sp-vlan>
p-bit profile <inner-marking-profile-name>]
```

- Add VLAN ID with p-bit set by copying from the incoming frame, and optionally add inner VLAN ID with p-bit set by copying from the incoming frame:

```
vlan-tag push vlan <sp-vlan> p-bit copy
[inner-vlan <inner-sp-vlan> p-bit copy]
```

- Remove VLAN ID, and optionally remove inner VLAN ID:

```
vlan-tag pop vlan [inner-vlan]
```

- Remove pushing of inner VLAN:

```
no vlan-tag [push inner-vlan]
```

9. To discard traffic transmitted via the flow, enter **drop**
10. Activate the flow (the flow is created as inactive by default):
    no shutdown

Note *You can activate a flow only if it is associated with at least a classifier profile, ingress port, and egress port.*

Configuring Management Flows

This section provides an example of configuring management flows for out-of-band management via the Ethernet management port, tagged with management VLAN 105.

You can set up the following flows:

- The flow to the host forwards frames from the management VLAN
- The flow from the host forwards all frames, adding the management VLAN and priority.

➤ To configure the flow to the host:

1. Set up a classifier profile to forward frames from VLAN 105:

```
ETX-204A# configure flows
ETX-204A>config>flows# classifier-profile v105 match-any
ETX-204A>config>flows>classifier-profile(v105)$ match vlan 105
ETX-204A>config>flows>classifier-profile(v105)$ exit all
ETX-204A#
```

2. Set up a flow using the previously defined classifier profile, with ingress at the Ethernet management port and egress at the host:

```
ETX-204A# configure flows
ETX-204A>config>flows# flow fh_in
ETX-204A>config>flows>flow(fh_in)$ no policer
ETX-204A>config>flows>flow(fh_in)$ classifier v105
ETX-204A>config>flows>flow(fh_in)$ ingress-port ethernet 101
ETX-204A>config>flows>flow(fh_in)$ egress-port host queue 1
ETX-204A>config>flows>flow(fh_in)$ no shutdown
ETX-204A>config>flows>flow(fh_in)$ exit all
ETX-204A#
```

➤ To configure the flow from the host:

1. Set up a classifier profile to forward all frames:

```
ETX-204A# configure flows
ETX-204A>config>flows# classifier-profile mng_all match-any
ETX-204A>config>flows>classifier-profile(mng_all)$ match all
ETX-204A>config>flows>classifier-profile(mng_all)$ exit all
ETX-204A#
```

2. Set up a flow using the previously defined classifier profile, with ingress at the host and egress at the Ethernet management port, and pushing VLAN 105 with p-bit 6:

```
ETX-204A# configure flows
ETX-204A>config>flows# flow fh_out
ETX-204A>config>flows>flow(fh_out)$ classifier mng_all
ETX-204A>config>flows>flow(fh_out)$ ingress-port host
ETX-204A>config>flows>flow(fh_out)$ egress-port ethernet 101
ETX-204A>config>flows>flow(fh_out)$ vlan-tag push vlan 105 p-bit fixed 6
ETX-204A>config>flows>flow(fh_out)$ no shutdown
ETX-204A>config>flows>flow(fh_out)$ exit all
ETX-204A#
```

Testing Flows

You can run application layer loopbacks on a flow, with exchange of source and destination MAC addresses or IP addresses of incoming packets. This applies to all the data associated with the flow.

➤ To run an application layer loopback test:

1. Create a flow with the ingress port equal to the egress port.
2. Switch to the context of the above flow (**config>flows>flow** flow-name)
3. Enter: **test** [{mac-swap|ip-swap}] [duration <seconds>] [ttl-force <ttl>].

   The flow is activated, and the TEST LED is turned on. The test runs for the duration specified. If 0 is specified for the duration, the test runs until it is stopped manually.

Note *Regardless of whether the* ***mac-swap*** *or* ***ip-swap*** *option is specified, if there is an IP header in the frames, then both MAC and IP address are swapped, otherwise only the MAC is swapped.*

➤ To end the test:

1. Switch to the context of the flow that has the test running (**config>flows>flow** flow-name)
2. Enter: **no test.**

Displaying Flow Statistics

You can display the number of forwarded and discarded packets and bytes for a flow.

Note *Refer to* Configuring Policer Aggregate Parameters *for information on displaying statistics for flows associated with policer aggregates*

➤ To display the statistics for a flow:

- At the relevant flow context (**config>flows>flow(**<flow-id>**)**), enter **show statistics running**.

  Flow statistics are displayed.

➤ To clear the statistics for a flow:

- At the relevant flow context (**config>flows>flow(**<flow-id>**)**), enter **clear-statistics**.

  The statistics for the flow are cleared.

4.6 Ethernet OAM

Configuring OAM CFM (Connectivity Fault Management)

ETX-204A provides the functions listed below for operation, administration, and maintenance (OAM) in packet-switched networks:

- Continuity check
- Non-intrusive loopback, used to detect loss of bidirectional continuity.
- Performance measurements (per service).

The device supports:

- Up to 64 maintenance domains (MDs)
- Up to 64 maintenance associations (MAs)
- Up to 64 maintenance endpoints (MEPs). Up to eight MEPs can be configured for an MA.
- Up to 100 remote MEPs. Up to 100 remote MEPs can be configured for a MEP.
- Up to 100 services. Up to eight services can be configured for a MEP.

Note *The above limits are subject to the limit of 300 received PPS (packets per second).*

➤ To configure OAM CFM:

- Navigate to the CFM (Connectivity Fault Management) context (**config>oam>cfm**) and specify the MAC address for operation and maintenance:

  multicast-addr <mac-address>

  Default: 0180C2000030

Configuring Maintenance Domains

➤ To configure a maintenance domain (MD):

1. Navigate to the OAM CFM (Connectivity Fault Management) context (**config>oam>cfm**).
2. Specify the ID of the maintenance domain (MD):

   maintenance-domain <1–64>

   This creates a new maintenance domain or opens an existing one. The system switches to the specified maintenance domain context (**config>oam>cfm>md(**<mdid>**)**).

Note *When a maintenance domain is created, the following parameters are automatically set by default:*

- *Name (string format) – "MD<mdid>", for example the default name for maintenance domain 1 is "MD1"*
- *Maintenance domain level – 3*
- *Standard OAM protocol (no proprietary-cc).*

3. If required, set the name of the maintenance domain:

   name string <md-name-string>

   name dns <md-name-string>

   name mac-and-uint <md-name-mac> <md-name-uint>

   no name

   The following apply to the maintenance domain name:

   - Maximum length of `md-name-string` is 43 characters
   - The maximum combined length of `md-name-string` and `ma-name-string` (maintenance association name) is 48characters
   - Format **mac-and-uint** – Specify `md-name-mac` as `xx-xx-xx-xx-xx-xx`, and `md-name-uint` as an unsigned integer decimal number (0–65535)
   - If prestandard OAM protocol is being used, the maintenance domain must have no name (use command **no name**).

4. If required, set the maintenance domain level:

   md-level <0–7>

   Default: 3

Note *If prestandard OAM protocol is being used, the only allowed value for the maintenance domain level is 3.*

5. Set the type of OAM protocol for the MD if necessary:

   - To use standard OAM protocol, enter:
     no proprietary-cc
   - To use prestandard OAM protocol, enter:
     proprietary-cc

   Default: Standard OAM protocol (**no proprietary-cc**)

Note *The MD name must be set to* ***no name*** *and the level to 3 before you can set the protocol to prestandard.*

➤ To delete an existing maintenance domain:

1. Navigate to the OAM CFM (Connectivity Fault Management) context (**config>oam>cfm**).
2. Enter:

   no maintenance-domain <1–64>

The maintenance domain is deleted.

Configuring Maintenance Associations

➤ To configure a maintenance association (MA):

1. At the Maintenance Domain context (**config>oam>cfm>md(**<mdid>), specify the ID of the maintenance association:

   maintenance-association <1–64>

   This creates a new maintenance association or opens an existing one. The system switches to the specified maintenance association context (**config>oam>cfm>md(**<mdid>**)>ma(**<maid>**)**).

Note *When a maintenance association is created, the following parameters are automatically set by default:*

- *Name (string format) – "MA<maid>", for example the default name for maintenance association 1 is "MA1"*
- *Continuity check interval – 1 second.*

2. If required, set the name of the maintenance association (MA):

   name string <ma-name-string>

   name primary-vid <ma-name-vid>

   name uint <ma-name-uint>

   name icc <ma-name-icc>

   The following apply to the maintenance association name:

   - Maximum length of `ma-name-string` is 45 characters
   - The maximum combined length of `md-name-string` and `ma-name-string` is 48 characters
   - Format **primary-vid** – Specify `md-name-vid` as 1–4094
   - Format **uint** – Specify `ma-name-uint` as an unsigned integer decimal number (0–65535)
   - If prestandard OAM protocol is being used, the maintenance domain must have no name (use command **no name**).

3. If required, set the continuity check interval:

   ccm-interval {100ms|1s|10s|1min|10min}

➤ To delete an existing maintenance association:

1. Navigate to the context of the maintenance domain that contains the maintenance association (**config>oam>cfm>md(**<mdid>**)**).
2. Enter:

   no maintenance-association <1–64>

   The maintenance association is deleted.

Configuring Maintenance Endpoints

You can associate a classifier profile or VLAN with a maintenance endpoint (MEP).

Note *For every MEP you must configure a flow with the same classification as the MEP, in the direction NNI to UNI.*

➤ To configure maintenance endpoints:

1. At the Maintenance Association context (**config>oam>cfm>md(**<mdid>**)>ma(**<maid>**)**), define a maintenance endpoint and assign an ID to it:

   mep <1–8191>

   This creates a new maintenance endpoint or opens an existing one. The system switches to the specified maintenance endpoint context (**config>oam>cfm>md(**<mdid>**)>ma(**<maid>**)>mep(**<mepid>**)**).

Note *When a maintenance endpoint is created, the following parameters are automatically set by default:*

- *Destination address type – multicast*
- *Initiate continuity check messages (CCM)*
- *CCM priority – 0.*

2. To associate the maintenance endpoint (MEP) with a classifier profile or VLAN, enter:

   classification profile <profile-name> **queue** <queue-id> **block** <queue-block-id>

   classification profile <profile-name> **queue-mapping** <queue-map-profile-name> **block** <queue-block-id>

   classification vlan <vlan-id> **queue** <queue-id> **block** <queue-block-id>

   classification vlan <vlan-id> **queue-mapping** <queue-map-profile-name> **block** <queue-block-id>

Note *You can associate more than one MEP to the same VLAN if the MEPs belong to MDs with different levels.*

3. Define the MAC address type sent in OAM continuity check messages (CCM) and performance measurement messages (PM) The MAC address can be either the standard multicast or a user-defined unicast address:

   dest-addr-type [ccm {unicast|multicast}**] [pm** {unicast|multicast}**]**

   Default: multicast for CCM messages, unicast for PM messages

Note *If more than one remote MEP ID has been defined for the MEP and you change the destination address type from multicast to unicast, all remote MEP IDs are deleted except for the lowest remote MEP ID.*

- *If more than one remote MEP ID has been defined for the MEP and you change the CCM destination address type from multicast to unicast, all remote MEP IDs are deleted except for the lowest remote MEP ID.*
- *If the MAC address type for PM messages is unicast, then the MAC address for the transmission of PM messages is determined by the configuration of the destination NE. If a remote MAC address is configured for the destination NE, that MAC is used. Otherwise if a remote MEP ID is configured for the destination NE, the remote MAC address is learned from CCM messages. Refer to* Configuring Destination NEs *for details.*

4. If you defined unicast MAC address type for CCM messages with the **dest-addr-type** command, you have to define a unicast MAC address:

   dest-mac-addr <xx-xx-xx-xx-xx-xx>

5. To define the remote MEP ID with which the MEP communicates, enter:

   remote-mep <1–8191>

Note *The MEP ID and the Remote MEP ID must be different. You can define up to five remote MEPs for the local MEP if standard OAM protocol is being used for the MD and the destination address type is multicast, otherwise you can define only one remote MEP.*

6. To activate the MEP, enter **no shutdown**. To deactivate the MEP, enter **shutdown.**

➤ To configure continuity check message initiation and priority:

- To enable initiating continuity check messages, at the MEP context (**config>oam>cfm>md(**<mdid>**)>ma(**<maid>**)>mep(**<mepid>**)**), enter **ccm-initiate**

  By default, initiating continuity check messages is enabled for the MEP.
- To disable initiating continuity check messages, enter **no ccm-initiate**
- To specify the priority of CCMs and LTMs transmitted by the MEP, enter **ccm-priority <**0–7**>**
- Default: 0

➤ To configure the continuity verification:

- At the Maintenance Endpoint context (**config>oam>cfm>md(**<mdid>**)>ma(**<maid>**)>mep(**<mepid>**)**), enter:

  continuity-verification {cc-based|lb-based}

  Default: cc-based

  This parameter is visible only in prestandard mode and can be configured only if **ccm-initiate** is enabled as explained above. Use **lb-based** only for RAD proprietary OAM functionality.

➤ To check the maintenance endpoint status:

- At the Maintenance Endpoint context (**config>oam>cfm>md(**<mdid>**)>ma(**<maid>**)>mep(**<mepid>**)**), enter **show status**

```
ETX-204A>config>oam>cfm>md(1)>ma(1)>mep(1)# show status
Port Type              : Ethernet
Port Index             : 1
Classification Profile : Classifier1
Priority               : 0

MD Name              : MD1
MA Name              : MA1
Cross Connect Status : OK

Remote MEP   Remote MEP Address    Operational Status
-------------------------------------------------------
2            00-20-D2-2C-97-A9     OK
```

Figure 4-7. Displaying Maintenance Endpoint Status

➤ To check the remote maintenance endpoint status:

- At the Maintenance Endpoint context (**config>oam>cfm>md(**<mdid>**)>ma(**<maid>**)>mep(**<mepid>**)**), enter **show remote-mep <**remote-mep-id> **status**

```
ETX-204A>config>oam>cfm>md(1)>ma(1)>mep(1)# show remote mep 2 status
Remote MEP Address : 00-20-D2-2C-97-A9
Operational Status : OK
```

Figure 4-8. Displaying Remote Maintenance Endpoint Status

➤ To send OAM loopback messages:

- To send LBM messages to a remote MEP, at the Maintenance Endpoint context (**config>oam>cfm>md(**<mdid>**)>ma(**<maid>**)>mep(**<mepid>**)**):
  - To specify remote MEP by MAC address, enter: **lbm address** <xx-xx-xx-xx-xx-xx> **repeat** <1-50>
  - To specify remote MEP by ID, enter: **lbm remote-mep <**remote-mep-id> **repeat** <1-50>
- To check the OAM loopback results:
  - At the Maintenance Endpoint context (**config>oam>cfm>md(**<mdid>**)>ma(**<maid>**)>mep(**<mepid>**)**), enter **show lbm-results**

➤ To send OAM link trace messages:

- To send link trace messages to a remote MEP, at the Maintenance Endpoint context (**config>oam>cfm>md(**<mdid>**)>ma(**<maid>**)>mep(**<mepid>**)**):
  - To specify remote MEP by MAC address, enter: **linktrace address** <xx-xx-xx-xx-xx-xx> [**ttl** <1-64>]

- To specify remote MEP by ID, enter:
  linktrace remote-mep <remote-mep-id> [**ttl** <1-64>]

- To check the OAM link trace results:
  - At the Maintenance Endpoint context (**config>oam>cfm>md(**<mdid>**)>ma(**<maid>**)>mep(**<mepid>**)**), enter
    show linktrace-results

➤ **To delete an existing maintenance endpoint:**

1. Navigate to the context of the maintenance association that contains the maintenance endpoint (**config>oam>cfm>md(**<mdid>**)>ma(**<maid>**))**.
2. Enter:

   no mep <1–8191>

   The maintenance endpoint is deleted.

Note *You can remove a maintenance endpoint regardless of whether it contains services.*

Configuring Maintenance Endpoint Services

You can configure up to eight services on a MEP, corresponding to each p-bit. Only one service is allowed if the classifier profile associated with the MEP is according to p-bit.

➤ **To configure services for a maintenance endpoint:**

1. At the Maintenance Endpoint context (**config>oam>cfm>md(**<mdid>**)>ma(**<maid>**)>mep(**<mepid>**)**), enter:

   service <1–8>

   The system switches to the specified service context (**config>oam>cfm> md(**<mdid>**)>ma(**<maid>**)>mep(**<mepid>**)>service(**<serviceid>**)**).

2. To specify delay threshold, enter:

   delay-threshold <1–1000>

   Default: 1

3. To specify delay variation threshold, enter:

   delay-var-threshold <1–1000>

   Default: 1

4. To associate this service with a p-bit, enter:

   classification priority-bit <0–7>

   Only one service can be defined on each p-bit.

   Default: 0.

5. Define the interval for performance measurement messages, to be used by all remote NEs defined for service:

   interval {100ms | 1s | 10s |1min | 10min}

Default: 1s

6. To activate the service, enter **no shutdown**. To deactivate the service, enter **shutdown**.

Note *You can activate a service only if the corresponding MEP is active.*

Configuring Destination NEs

You can configure up to 100 destination NEs for a service.

For performance measurement it is necessary to know the exact address of the destination NE. You can configure the remote MAC address of the NE or ETX-204A can learn it from the CCM messages.

If the remote MAC address is not configured and needs to be learned, performance measurement messages are sent only after the address is learned.

➤ To configure destination NEs:

1. At the service context (**config>oam>cfm>md(**<mdid>**)>ma(**<maid>**)>mep(**<mepid>**)> service(**<serviceid>**)**), enter:
   dest-ne <1–100>

   The system switches to the specified destination NE context (**config>oam>cfm>md(**<mdid>**)>ma(**<maid>**)>mep(**<mepid>**)> service(**<serviceid>**)>dest-ne(**<dest-neid>**)**)

2. To define the MAC address or remote MEP ID of the destination NE, enter:

   remote {mac-addr <mac-address> **| mepid** <remote-mep-id> **}**

Note *If you define a remote MEP ID, ETX-204A must learn the remote MAC address before performance measurement messages can be sent.*

3. To enable the performance measurement of the destination NE, enter:

   pm {single-ended-loss | two-way-delay}

4. To disable some or all of the performance measurement of the destination NE, enter:

   no pm [{single-ended-loss | two-way-delay}**]**

Configuring OAM CFM Service Event Reporting

In addition to the regular OAM statistics collection, ETX-204A supports proactive SLA measurements per OAM service, as per RMON-based RFC 2819. The device sends reports when one of the counters rises above or drops below the set thresholds within the specified sampling period of time. These reports can be sent as SNMP traps to the defined network management stations, or written to the event log.

The following counters can be monitored:

- Frame Loss Ratio – Total number of lost OAM frames divided by total number of transmitted OAM frames since the service was activated
- Frames Above Delay – Number of frames that exceeded delay threshold

- Frames Above Delay Variation – Number of frames below or equal delay threshold
- Unavailability Ratio – Total number of unavailable seconds divided by elapsed time since service was activated.

➤ **To configure the event reporting for a service:**

1. Navigate to the CFM fault context (**config>fault>cfm**).
2. Specify the service and event for which you wish to configure event reporting:

   service md <mdid> **ma** <maid> **mep** <mepid> **service** <serviceid> {loss-ratio|above-delay|above-delay-var|unavailability-ratio}

   The system switches to the CFM fault context of the specified service (**config>fault>cfm>service(**serviceid**)**).
3. To define the type of event reporting for the event, enter:
   frames-report [event {none|log|trap|logandtrap}] [rising-threshold <rising-threshold>] [falling-threshold <falling-threshold>] [sampling-interval <value>]

Note

- *Sampling interval value must be at least double rising threshold*
- *Rising threshold must be greater than falling-threshold.*

4. To cancel event reporting for the service, in the CFM fault context of the specified service (**config>fault>cfm>service(**serviceid**)**) enter:
   no frames-report

Table 4-7. Service Event Reporting Parameters

Parameter	Description	Possible Values
event	Specifies the type of event reporting	**none** – The event is not reported **log** – The event is reported via the event log **trap** –An SNMP trap is sent to report the event **logandtrap** –The event is reported via the event log and an SNMP trap

Parameter	Description	Possible Values
rising-threshold	A value above this threshold within the sampling interval for the particular event is considered as rising event occurred Default: • For events **above-delay** or **above-delay-var**: 1 • For events **loss-ratio** or **unavailability-ratio**: 1e-10	• For events **above-delay** or **above-delay-var**: 1–60 • For events **loss-ratio** or **unavailability-ratio**: 1e-3 1e-4 1e-5 1e-6 1e-7 1e-8 1e-9 1e-10
falling-threshold	A value below this threshold within the sampling interval for the particular event is considered as falling event occurred Default: • For events **above-delay** or **above-delay-var**: 1 • For events **loss-ratio** or **unavailability-ratio**: 1e-10	• For events **above-delay** or **above-delay-var**: 1–60 • For events **loss-ratio** or **unavailability-ratio** 1e-3 1e-4 1e-5 1e-6 1e-7 1e-8 1e-9 1e-10
sampling-interval	Specifies the interval in seconds over which the data is sampled and compared with the rising and falling thresholds	

Displaying OAM CFM Statistics

You can display end-to-end performance monitoring data for the OAM services and destination NEs.

ETX-204A measures performance in fixed 15-minute intervals. It also stores performance data for the last 24 hours (96 intervals).

You can view the following types of statistics for services:

- Running – OAM statistics collected since the service was activated
- Day – OAM statistics for the last 24 hours, or the amount of time since the service was activated, if less than 24 hours.
- Interval – OAM statistics for the current interval or a selected interval. You can select an interval only if it has already ended since the service was activated.

  When a service is first activated, you can view statistics for only the current interval. The statistics data is shown for the time elapsed since the beginning of the interval. When the current interval ends, it becomes interval 1 and you

can select it for viewing interval statistics. After each interval ends, you can select it for viewing interval statistics.

You can view the following types of statistics for destination NEs:

- Running – OAM statistics collected since performance measurement of the NE started
- Day – OAM statistics for the last 24 hours
- Interval – OAM statistics for the current interval or a selected interval.

➤ **To display the OAM CFM statistics for a service:**

1. Navigate to the level corresponding to the OAM service for which you wish to view the statistics (**`configure oam cfm maintenance-domain`** `<mdid>` **`maintenance-association`** `<maid>` **`mep`** `<mepid>` **`service`** `<serviceid>`).

   The following prompt is displayed:
   `config>oam>cfm>md``(<mdid>)`**`>ma`**`(<maid>)`**`>mep`**`(<mepid>)`**`>service`**`(<serviceid>)#`.

2. Enter all necessary commands according to the tasks listed below.

Note *The service for which you wish to view the statistics must be active. If the service is not active, the commands to view statistics are not recognized.*

Task	Command	Comments
Viewing running statistics	**`show statistics running`**	The statistics are displayed as listed in *Table 4-8*
Viewing statistics for the current interval	**`show statistics current`**	The statistics for the current interval are displayed as listed in *Table 4-9*
Viewing the statistics for a selected interval	**`show statistics interval`** `<interval-num>`	• Allowed values for **interval-num**: 1–96 • The statistics for the selected interval are displayed as listed in *Table 4-9* • If you specified an interval that has not yet ended since the service was activated, a message is displayed that the interval doesn't exist.
Viewing statistics for the past 24 hours, or the amount of time since the service was activated if less than 24 hours	**`show statistics day`**	The statistics for the day are displayed as listed in *Table 4-9*

Task	Command	Comments
Viewing running statistics, statistics for the current interval, statistics for all intervals, and day statistics	**show statistics all**	The statistics are displayed as listed in *Table 4-8* and *Table 4-9*
Viewing statistics for all intervals	**show statistics all-intervals**	The statistics are displayed as listed in *Table 4-9*
Clearing the statistics for the service	**clear-statistics**	All statistics data for the service are cleared, including the stored interval data, except for the elapsed time since the start of the current 15-minute interval

➤ To display the OAM CFM statistics for a destination NE:

1. Navigate to the level corresponding to the destination NE for which you wish to view the statistics (**configure oam cfm maintenance-domain** <mdid> **maintenance-association** <maid> **mep** <mepid> **service** <serviceid> **dest-ne** < dest-ne-index>).

   The following prompt is displayed:
   config>oam>cfm>md(<mdid>)**>ma**(<maid>)**>mep**(<mepid>**)>service**(<serviceid>)**>dest-ne**(<dest-ne-index>)#.

2. Enter all necessary commands according to the tasks listed below.

Task	Command	Comments
Viewing running statistics	**show statistics running**	The statistics are displayed as listed in *Table 4-8* and *Table 4-10*
Viewing statistics for the current interval	**show statistics current**	The statistics for the current interval are displayed as listed in *Table 4-9* and *Table 4-10*
Viewing the statistics for a selected interval	**show statistics interval** <interval-num>	• Allowed values for **interval-num**: 1–96 • The statistics for the selected interval are displayed as listed in *Table 4-9* and *Table 4-10* • If you specified an interval that has not yet ended since the corresponding service was activated, a message is displayed that the interval doesn't exist.

Task	Command	Comments
Viewing statistics for a day	**show statistics day**	The statistics for the past 24 hours are displayed as listed in *Table 4-9* and *Table 4-10*
Viewing running statistics, statistics for the current interval, statistics for all intervals, and day statistics	**show statistics all**	The statistics are displayed as listed in *Table 4-8* and *Table 4-9*
Viewing statistics for all intervals	**show statistics all-intervals**	The statistics are displayed as listed in *Table 4-9*
Clearing the statistics for the destination NE	**clear-statistics**	All statistics data for the destination NE are cleared, including the stored interval data, except for the elapsed time since the start of the current 15-minute interval

Table 4-8. OAM Running Statistic Counters

Parameter	Description
Transmitted Frames	Total number of OAM frames transmitted since the service was activated
Near End Frames Loss	Total number of OAM frames lost from remote MEP to local MEP since the service was activated
Near End Frames Loss Ratio	Total number of OAM frames lost from remote MEP to local MEP, divided by total number of transmitted OAM frames since the service was activated
Far End Frames Loss	Total number of OAM frames lost from local MEP to remote MEP since the service was activated
Far End Frames Loss Ratio	Total number of OAM frames lost from local MEP to remote MEP, divided by total number of transmitted OAM frames since the service was activated
Elapsed Time	Time (in seconds) elapsed since the service was activated
Unavailable Seconds	Total number of unavailable seconds since the service was activated
Unavailable Ratio	Total number of unavailable seconds divided by elapsed time
Frames Above Delay	Number of frames that exceeded delay threshold
Frames Above Delay Variation	Number of frames below or equal delay threshold
Current Delay	Current delay of frames
Current Delay Variation	Current delay variation

Table 4-9. OAM Interval and Day Statistic Counters

Parameter	Description
Interval	Number of selected interval (relevant only when displaying statistics for a selected interval)

Parameter	Description
Above Delay Threshold	Number of frames that exceeded delay threshold
Below Delay Threshold	Number of frames below or equal delay threshold
Above Delay Var Threshold	Number of frames that exceeded delay variation threshold
Below Delay Var Threshold	Number of frames below or equal delay variation threshold
Transmitted Frames	Total number of OAM frames transmitted in the interval or day
Near End Frames Loss	Number of frames lost from remote MEP to local MEP
Far End Frames Loss	Number of frames lost from local MEP to remote MEP
Min Round Trip Delay	Minimum round trip delay (in mseconds) calculated in the interval (or up to elapsed time in current interval)
Max Round Trip Delay	Maximum round trip delay (in mseconds) calculated in the interval (or up to elapsed time in current interval)
Avg Round Trip Delay	Average round trip delay (in mseconds) calculated in the interval (or up to elapsed time in current interval)
Max Round Trip Delay Var	Maximum delay variation (in mseconds) calculated in the interval (or up to elapsed time in current interval)
Avg Round Trip Delay Var	Average delay variation (in mseconds) calculated in the interval (or up to elapsed time in current interval)
Elapsed Time	Time (in seconds) elapsed since the start of the current interval (relevant only when displaying statistics for current interval)
Unavailable Seconds	Total number of unavailable seconds for which the service was unavailable in the interval or day

Table 4-10. OAM Statistic Counters for Destination NEs

Parameter	Description
Transmitted LMMs	Transmitted loss measurement messages
Transmitted DMMs	Transmitted delay measurement messages
Transmitted LMRs	Transmitted loss measurement replies
Transmitted DMRs	Transmitted delay measurement replies
Received LMMs	Received loss measurement messages
Received DMMs	Received delay measurement messages
Received LMRs	Received loss measurement replies
Received DMRs	Received delay measurement replies

Configuring OAM EFM

ETX-204A can act as the active or passive side in an IEEE 802.3-2005 application.

There are two available OAM EFM descriptors. By default OAM EFM descriptor 1 is configured as passive. If you need an OAM EFM descriptor for an active interface you can configure OAM EFM descriptor 2 as active.

When link OAM (EFM) is enabled for a port, you can view its status by displaying the port status (**show status**). You can also display the OAM (EFM) parameters and OAM (EFM) statistics.

➤ **To configure OAM EFM descriptor:**

1. Navigate to **configure oam efm**.

   The **config>oam>efm#** prompt is displayed.

2. Enter:
   descriptor 2 active.

Note *You cannot configure OAM EFM descriptor 1.*

➤ **To configure link OAM (EFM) for Ethernet ports:**

1. Navigate to **configure port ethernet** <port-num>.

   The **config>port>eth**(<port-num>)#prompt is displayed.

2. Enter all necessary commands according to the tasks listed below.

Task	Command	Comments
Enabling link OAM (EFM)	**efm descriptor** <1–2>	The EFM descriptor must exist before you can assign it to a port ***Note****: In order for link OAM (EFM) to function properly, the relevant Ethernet port must be associated with an L2CP profile that specifies peer action for MAC 0x02.*
Disabling link OAM (EFM)	**no efm**	
Displaying link OAM (EFM) parameters ***Note****: Allowed only if link OAM (EFM) is enabled*	**show oam-efm**	
Displaying link OAM (EFM) statistics ***Note****: Allowed only if link OAM (EFM) is enabled*	**show oam-efm-statistics**	

For example:

➤ To display the link OAM (EFM) status for Ethernet port 1:

```
ETX-204A# configure port ethernet 1
ETX-204A>config>port>eth(1)# show oam-efm
Administrative Status : Enabled
Operational Status    : Link Fault
Loopback Status       : Off

Information
------------------------------------------------------------
                  Local                       Remote
Mode            : Passive                     --
MAC Address     : 00-20-D2-30-CC-9D           --
PDU Size        : 1518                        --
Unidirectional  : Not Supported               --
Variables       : Not Supported               --
Events          : Not Supported               --
Loopback        : Not Supported               --
Vendor OUI      : 0x0020D2                    --

ETX-204A>config>port>eth(1)#
```

4.7 Clock Selection

ETX-204A supports one clock domain with up to two clock sources. The sources can be network/user Ethernet ports or the station clock. The timing subsystem automatically selects the best timing source to use for synchronization.

Configuring the Clock Domain

The domain parameters include the synchronization network type and the timing quality level.

The synchronization network type identifies the type of synchronization network connections and the synchronization level. Each synchronization network connection is provided by one or more synchronization link connections, each supported by a synchronized PDH trail, SDH multiplex section trail, or 802.3 physical media trail.

The synchronization network types are:

1. Option I (Europe)
2. Option II (USA)
3. Option III (Japan)

You can define the timing quality level of the domain and source, or work without quality level. The supported quality levels are according to the synchronization network type, as shown in the following tables. The quality levels are shown in order of highest quality level to lowest quality level.

Table 4-11. Option I Quality Levels

Quality Level	Description	Rank
PRC	Timing source is Primary Reference Clock as defined in Recommendation G.811	Highest
SSU-A	Timing source is Type I or V Synchronization Supply Unit (SSU) clock as defined in Recommendation G.812	|
SSU-B	Timing source is Type VI Synchronization Supply Unit (SSU)clock as defined in Recommendation G.812	|
SEC	Timing source is Synchronous Equipment Clock as defined in Recommendation G.813 or G.8262, Option I	|
DNU	Do Not Use – This signal should not be used for synchronization	Lowest

Table 4-12. Option II Quality Levels

Quality Level	Description	Rank
PRS	Timing source is Primary Reference Source clock as defined in Recommendation G.811	Highest
STU	Synchronization Traceability Unknown – Timing signal does not carry a quality level indication of the source	|
ST2	Timing source is Stratum 2 clock as defined in Recommendation G.812, Type II	|
TNC	Timing source is Transit Node Clock as defined in Recommendation G.812, Type V	|
ST3E	Timing source is Stratum 3E clock as defined in Recommendation G.812, Type III	|
ST3	Timing source is Stratum 3 clock as defined in Recommendation G.812, Type IV	|
SMC	Timing source is SONET/Ethernet self-timed clock as defined in Recommendation G.813 or G.8262, Option II	|
ST4	Timing source is Stratum 4 free-running clock (applicable only to 1.5 Mbit/s signals)	|
PROV	Provisionable by the network operator	|
DUS	Don't Use for Sync – This signal should not be used for synchronization	Lowest

Table 4-13. Option III Quality Levels

Quality Level	Description	Rank
UNK	Timing source is unknown	Highest

Quality Level	Description	Rank
SEC	Timing source is Synchronous Equipment Clock as defined in Recommendation G.813 or G.8262, Option I	|
DNU	Do Not Use – This signal should not be used for synchronization	Lowest

By default, if a timing card is installed in the unit a clock domain entry is created with the following configuration:

- Synchronization network type 1
- Quality DNU
- Mode auto (clock selection mechanism functions normally).

➤ To configure the clock domain:

1. Navigate to **`configure system clock domain 1`**.

   The **`config>system>clock>domain(1)#`** prompt is displayed.

2. Enter all necessary commands according to the tasks listed below.

Task	Command	Comments
Setting synchronization network type ***Note**: When you change the synchronization network type, you have to redefine the clock sources.*	**`sync-network-type { 1 | 2 | 3 }`**	Type 1 – Europe Type 2 – USA Type 3 – Japan
Setting quality of clock ***Note**: The quality values are according to the synchronization network type defined for the domain (refer to* Table 4-11 *to* Table 4-13*).*	**`quality min-level-station { prc | ssu-a | ssu-b | sec | dnu }`** **`quality min-level-station { prs | stu | st2 | tnc | st3e | st3 | smc | st4 | dus | prov }`** **`quality min-level-station { unk | sec | dnu }`**	Typing **`no quality`** removes the quality parameter. If no quality is defined for the domain you cannot configure quality level for the sources.
Setting clock mode	**`mode { auto | free-run }`**	**`auto`** –Clock selection mechanism functions normally, e.g. the best available clock source is selected for synchronization **`free-run`** – Internal oscillator is used for synchronization
Forcing selection of a particular clock source when the sources have different quality levels	**`force`** `<source-id>`	

Task	Command	Comments
Manually selecting a particular clock source in the following conditions: • No quality is defined for the clock domain • The sources have the same qualities • The sources have different priorities.	**manual** <source-id>	
Canceling previously issued **force** or **manual** command	**clear**	
Adding clock source (refer to *Configuring the Clock Sources*)	**source** <src-id> **rx-port ethernet** <port-num> **source** <src-id> **station 1**	
Configuring clock source (refer to *Configuring the Clock Sources*)	**source** <src-id>	Typing **no source** <src-id> deletes the source
Displaying status	**show status**	
Clearing statistics for clock sources	**clear-statistics**	

Configuring the Clock Sources

You can define up to two clock sources for the domain. The sources can be Ethernet ports or the station clock.

When a clock source is created, its default configuration is the following (refer to the task list below for explanations of the parameters):

- Priority = 2
- Wait-to-restore = five minutes (300 seconds)
- Hold-off = 300 milliseconds.

➤ To add a clock source:

1. Navigate to **configure system clock domain 1**.

   The **config>system>clock>domain(1)#** prompt is displayed.

2. Type one of the following, according to whether the clock source port is an Ethernet port or the station clock:
   source <1–2> **rx-port ethernet** <port-num>
   source <1–2> **station 1**

   The clock source is created and the **config>system>clock>domain(1)>source(**<1–2>**)$** prompt is displayed.

3. Enter all necessary commands according to the tasks listed below the following procedure.

➤ **To configure a clock source for which the port has been defined:**

1. Navigate to **`configure system clock domain 1`**.

   The **`config>system>clock>domain(1)#`** prompt is displayed.

2. Type **`source`** <1–2> to select the source to configure.

   The **`config>system>clock>domain(1)>source(`**<1–2>**`)#`** prompt is displayed.

3. Enter all necessary commands according to the tasks listed below.

Task	Command	Comments
Setting priority *Note: Priority 1 is the highest.*	**`priority`** <1–2>	
Setting quality level *Notes:* • *If no quality is defined for the domain, this command is not available* • *The quality level values are according to the synchronization network type defined for the domain (refer to* Table 4-11 *to* Table 4-13*).*	**`quality-level`** { **`prc`** | **`ssu-a`** | **`ssu-b`** | **`sec`** | **`dnu`** | **`ssm-based`** } **`quality-level`** { **`prs`** | **`stu`** | **`st2`** | **`tnc`** | **`st3e`** | **`st3`** | **`smc`** | **`st4`** | **`dus`** | **`ssm-based`** | **`prov`** } **`quality-level`** { **`unk`** | **`sec`** | **`dnu`** | **`ssm-based`** }	The quality level **`ssm-based`** indicates the quality level is based on SSM messages
Defining amount of time (in seconds) that a previously failed synchronization source must be fault free in order to be considered available	**`wait-to-restore`** <0–720>	
Defining amount of time (in milliseconds) that signal failure must be active before it is transmitted	**`hold-off`** <300–1800>	
Canceling the wait-to-restore timer of a clock source. This is useful if a timing source fault is cleared and you want the source to be immediately available.	**`clear-wait-to-restore`**	
Displaying status	**`show status`**	
Displaying statistics	**`show statistics`**	

Configuring the Station Clock

The station clock is an E1/2MHz port that can be used for synchronization. You can set the station clock timing to be based on the internal system clock or recovered from the received signal.

➤ To configure the station clock:

1. Navigate to **`configure system clock station 1`**.

   The **`config>system>clock>station(1)#`** prompt is displayed.

2. Enter all necessary commands according to the tasks listed below.

Task	Command	Comments
Setting clock timing to be based on internal system or external source	**`tx-clock-source`** {**`system`** | **`loopback-timing`**}	**`system`** – Timing based on internal system **`loopback-timing`** – Timing based on E1/2MHz external source
Setting interface type ***Note:*** *You can configure the interface type only if the station clock is administratively disabled (shutdown).*	**`interface-type e1`** [{**`balanced`** | **`unbalanced`**}] **`interface-type 2mhz`** [{**`balanced`** | **`unbalanced`**}]	If you specify **`e1`** or **`2mhz`** and do not specify **`balanced`** or **`unbalanced`**, by default the interface is set as balanced
Setting line code ***Note:*** *You can configure the line code only if the interface type is E1 and the station clock is administratively disabled (shutdown).*	**`line-code`** { ami | **`hdb3`** }	**`ami`** – Referred to as Alternate Mark Inversion because a 1 is referred to as a mark and a 0 as a space **`hdb3`** – Referred to as High Density Bipolar of order 3, this code is a telecommunication line code based on AMI and used in E1 lines
Setting receiver sensitivity to adjust the signal's capability to reach destinations close by or farther away	**`rx-sensitivity`** {**`short-haul`** | **`long-haul`**}	
Administratively enabling station clock	**`no shutdown`**	Using **`shutdown`** disables the station clock

4.8 Fault Propagation

You can enable fault propagation to be triggered by failure detection on a network/user interface, which causes a user-configurable action (such as deactivation or OAM CFM failure message sent) to be performed on a

user/network interface. You can enable fault propagation in the network-to-user or user-to-network direction, for a pair of interfaces that can be two Ethernet ports, two MEPs, or an Ethernet port and a MEP.

You can define the following when you enable fault propagation for a pair of interfaces:

- Trigger:
  - If interface where failure is detected is Ethernet port:
    - LOS – Link down detected
  - If interface where failure is detected is MEP:
    - OAM CFM LOC – Loss of continuity detected
    - OAM CFM RDI – Remote defect indication detected
    - OAM CFM Interface status TLV –Remote port failure detected
- Action to take when fault propagation is triggered:
  - If interface where action is performed is Ethernet port:
    - Interface-deactivation
  - If interface where action is performed is MEP:
    - Send OAM CFM interface status TLV to indicate failure.
- Wait-to-restore time – The time period before enabling the shut-down interface or ceasing to send OAM CFM interface status once the failed interface has been restored.

Default Configuration

By default, no fault propagation is configured. When you configure fault propagation for a particular interface pair, the default configuration is as follows:

- No trigger defined for fault detection
- No action defined to be performed when fault is detected
- Wait-to-restore time = 0.

Configuring Fault Propagation

Follow this procedure to configure fault propagation:

1. Add a fault propagation entry for a pair of interfaces
2. Configure the fault propagation parameters for the entry:
   a. Specify the trigger(s)
   b. Specify the action
   c. Specify the wait-to-restore time if you do not want the default value 0.

Adding Fault Propagation Entry

➤ To add fault propagation for a pair of interfaces:

1. Navigate to **`configure fault`**.

2. Type the command:
fault-propagation <from-interface> **to** <to-interface> and enter the desired interfaces, as shown in *Table 4-14*.

   A prompt is displayed:
config>fault>fp(<from-interface>/**to**/<to-interface>)**$**.

3. Configure the fault propagation parameters as needed (refer to *Configuring Fault Propagation Parameters*).

Table 4-14. Fault Propagation Command Options

From Interface	To Interface	Command
MEP	Ethernet port	**fault-propagation mep** <md-id> <ma-id> <mep-id> **to port ethernet** <port-num>
Ethernet port	MEP	**fault-propagation port ethernet** <port-num> **to mep** <md-id> <ma-id> <mep-id>
MEP	MEP	**fault-propagation mep** <md-id> <ma-id> <mep-id> **to mep** <md-id> <ma-id> <mep-id>
Ethernet port	Ethernet port	**fault-propagation port ethernet** <port-num> **to port ethernet** <port-num>

Configuring Fault Propagation Parameters

➤ To configure fault propagation parameters:

1. Navigate to **configure fault fault-propagation** <from-interface> **to** <to-interface> to select the fault propagation entry to configure.

   A prompt is displayed:
config>fault>fp(<from-interface>/**to**/<to-interface>)**#**

2. Enter all necessary commands according to the tasks listed below.

Task	Command	Comments
Specifying the trigger(s) ***Note**: The **los** trigger is allowed only if the from-interface is an Ethernet port.The OAM CFM triggers are allowed only if the from-interface is a MEP.*	**trigger { los | oam-cfm-loc | oam-cfm-rdi | oam-cfm-if-status-tlv }**	Typing **no** before the command removes the specified trigger
Specifying the action to take when fault propagation is triggered ***Note**: The **interface-deactivation** action is allowed only if the to-interface is an Ethernet port. The **oam-cfm-if-status-tlv** action is allowed only if the to-interface is a MEP.*	**action-on-group { interface-deactivation | oam-cfm-if-status-tlv }**	Typing **no action-on-group** removes the action
Specifying the wait-to-restore time	**wait-to-restore** <seconds>	The range is 0–3600

For example:

➤ To enable fault propagation:

- From Ethernet port 4
- To MEP 3 in maintenance association 3 in maintenance domain 2 (this example assumes the MEP has been created)
- Trigger: LOS
- Action: Send OAM CFM interface status TLV
- Wait-to-restore time = 120 seconds.

```
ETX-204A# config fault
ETX-204A>config>fault# fault-propagation port ethernet 4 to mep 2 3 3
ETX-204A>config>fault>fp(port/ethernet/4/to/mep/2/3/3)$ trigger los
ETX-204A>config>fault>fp(port/ethernet/4/to/mep/2/3/3)$ action-on-g oam-cfm-if-stat
ETX-204A>config>fault>fp(port/ethernet/4/to/mep/2/3/3)$ wait-to-restore 120
ETX-204A>config>fault>fp(port/ethernet/4/to/mep/2/3/3)$ info detail
    action-on-group  oam-cfm-if-status-tlv
    trigger  los
    no trigger  oam-cfm-loc
    no trigger  oam-cfm-if-status-tlv
    no trigger  oam-cfm-rdi
    wait-to-restore  120

ETX-204A>config>fault>fp(port/ethernet/4/to/mep/2/3/3)$
```

➤ To enable fault propagation:

- From Ethernet port 1
- To Ethernet port 3
- Trigger: LOS
- Action: Shut down Ethernet port
- Wait-to-restore time = 90 seconds.

```
ETX-204A# config fault
ETX-204A>config>fault# fault-propagation port ethernet 1 to port ethernet 3
ETX-204A>config>fault>fp(port/ethernet/1/to/port/ethernet/3)$ trigger los
ETX-204A>config>fault>fp(port/ethernet/1/to/port/ethernet/3)$ action interface-deact
ETX-204A>config>fault>fp(port/ethernet/1/to/port/ethernet/3)$ wait-to-restore 90
ETX-204A>config>fault>fp(port/ethernet/1/to/port/ethernet/3)$ info detail
    action-on-group  interface-deactivation
    trigger  los
    no trigger  oam-cfm-loc
    no trigger  oam-cfm-if-status-tlv
    no trigger  oam-cfm-rdi
    wait-to-restore  90

ETX-204A>config>fault>fp(port/ethernet/1/to/port/ethernet/3)$
```

➤ To enable fault propagation:

- From MEP 1 in maintenance association 1 in maintenance domain 1 (this example assumes the MEP has been created)
- To MEP 2 in maintenance association 2 in maintenance domain 1 (this example assumes the MEP has been created)
- Trigger: Any OAM CFM error
- Action: Send OAM CFM interface status TLV
- Wait-to-restore time = 300 seconds.

```
ETX-204A# config fault
ETX-204A>config>fault# fault-propagation mep 1 1 1 to mep 1 2 2
ETX-204A>config>fault>fp(mep/1/1/1/to/mep/1/2/2)$ trigger oam-cfm-loc
ETX-204A>config>fault>fp(mep/1/1/1/to/mep/1/2/2)$ trigger oam-cfm-rdi
ETX-204A>config>fault>fp(mep/1/1/1/to/mep/1/2/2)$ trigger oam-cfm-if-status-tl
ETX-204A>config>fault>fp(port/ethernet/4/to/mep/2/3/3)$ action-on-g oam-cfm-if-stat
ETX-204A>config>fault>fp(port/ethernet/4/to/mep/2/3/3)$ wait-to-restore 300
ETX-204A>config>fault>fp(port/ethernet/4/to/mep/2/3/3)$ info detail
    action-on-group  oam-cfm-if-status-tlv
    no trigger  los
    trigger  oam-cfm-loc
    trigger  oam-cfm-if-status-tlv
    trigger  oam-cfm-rdi
    wait-to-restore  300

ETX-204A>config>fault>fp(port/ethernet/4/to/mep/2/3/3)$
```

Disabling Fault Propagation

➤ To disable fault propagation for a pair of interfaces:

1. Navigate to **`configure fault`**.
2. Type the command:
   `no fault-propagation` `<from-interface>` **`to`** `<to-interface>` to select the interfaces for which to disable fault propagation.

   The specified fault propagation is disabled.

4.9 Date and Time

You can set the date and time for the ETX-204A internal real-time clock or receive the NTP server clock signal.

Setting the Date and Time

➤ To set the date and time:

1. Navigate to the Date-Time context (**`config>system>date-and-time`**).
2. Specify the desired date format:

   For example: **`date-format yyyy-mm-dd`**.

3. Enter the date:

   Example: **`date 2008-07-21`**

4. Enter the time:

   Example: **`time 11:30:22`**

5. Enter the time zone relative to GMT, the current Greenwich main time:

   Example: **`zone gmt 11:30`**

Displaying the Date and Time

➤ To display the date and time:

- From the system context (**`config>system`**), enter **`show time`**

Working with SNTP

This section explains how to receive the clock signal from NTP servers in the network. ETX-204A can synchronize with up to ten servers, sending NTP requests to the servers at user-defined intervals.

You can set one of the active SNTP servers as the preferred server, so that ETX-204A sends NTP requests to the preferred server. If there is no preferred server or if the preferred server does not answer, then ETX-204A sends NTP requests to any enabled servers.

Default Configuration

The default configuration of the SNTP parameters is:

- No SNTP servers defined
- Polling interval set to 15 minutes.

When an SNTP server is defined, its default configuration is:

- IP address set to 0.0.0.0
- Not preferred
- Administratively disabled (shutdown).

Configuring SNTP Parameters

➤ To configure SNTP parameters:

1. Navigate to **`config system date-and-time sntp`**.

   The **`config>system>date-time#`** prompt is displayed.

2. Enter all necessary commands according to the tasks listed below.

Task	Command	Comments
Enabling broadcast mode	**broadcast**	If enabled, ETX-204A listens to NTP broadcast messages and obtains accurate timestampsfrom them. Type **no broadcast** to disable broadcast mode.
Setting polling interval (in minutes) for SNTP requests	**poll-interval interval** <1-1440>	
Defining and configuring SNTP servers (refer to *Defining SNTP Servers* and *Configuring SNTP Server Parameters*)	**server** <server-id>	
Displaying SNTP status	**show status**	

Defining SNTP Servers

➤ To define an SNTP server:

1. Navigate to **config system date-and-time sntp**.

   The **config>system>date-time#** prompt is displayed.

2. Type **server** <server-id> to define an SNTP server with ID <server-id>.

   The following prompt is displayed: **config>system>date-time>sntp>server**(<server-id>)**$**. The SNTP server parameters are configured by default as described in *Default Configuration*.

3. Configure the SNTP server parameters as needed, as described in *Configuring SNTP Server Parameters*.

Configuring SNTP Server Parameters

➤ To configure SNTP server parameters:

1. Navigate to **config system date-and-time sntp**.

   The **config>system>date-time#** prompt is displayed.

2. Type **server** <server-id> to select the SNTP server to configure.

   The following prompt is displayed: **config>system>date-time>sntp>server**(<server-id>)#..

3. Enter all necessary commands according to the tasks listed below.

Task	Command	Comments
Setting the IP address of the server	**address** <IP-address>	

Task	Command	Comments
Set SNTP server as preferred server. *Note: Only one server can be preferred.*	**prefer**	Type **no prefer** to remove preference
Setting UDP port for NTP requests, to a specific UDP port or to default UDP port (123)	**udp port** <1-65535> **udp default**	
Administratively enabling server	**no shutdown**	Using **shutdown** disables the server
Sending query to server and displaying result	**query-server**	

For example:

➤ To define SNTP server:

- Server ID = 1
- IP address = 192.1.1.1
- Preferred
- Administratively enabled

```
ETX-204A# configure system date-and-time sntp
ETX-204A>config>system>date-time>sntp# server 1
ETX-204A>config>system>date-time>sntp>server(1)# address 192.1.1.1
ETX-204A>config>system>date-time>sntp>server(1)# prefer
ETX-204A>config>system>date-time>sntp>server(1)# no shutdown
ETX-204A>config>system>date-time>sntp>server(1)# query-server
Query Server Replay
-------------------------------------------------------------------------
Server  : 192.1.1.1       UDP   : 123
Date    : 00-00-0000      Time  : 00:00:00
Stratum : 0
ETX-204A>config>system>date-time>sntp>server(1)# exit
ETX-204A>config>system>date-time>sntp# show status
System Uptime : 000 Days 00:19:55
System Time   : 2009-09-14                                13:01:09

Current Source : 1  127.0.0.1

NTP Server      Type       UDP Port Tstap Date Time     Strat Received


192.1.1.1       Prefer     123      00-00-0000 00:00:00 0     --
ETX-204A>config>system>date-time>sntp#
```

4.10 Syslog

ETX-204A uses the Syslog protocol to generate and transport event notification messages over IP networks to a Syslog server. The Syslog operation is compliant with the RFC 3164 requirements.

Configuring Syslog Parameters

➤ To configure syslog parameters:

1. Navigate to the system context (**config>system**).
2. Define syslog server parameters:
   a. Specify the syslog server to receive syslog messages, from 1 to 5:
      syslog server <server-ID>.

      The system switches to the context of the specified syslog server (**config>system>syslog**(server <server-ID>)).
   b. Specify the IP address of the server:

      address <0.0.0.0–255.255.255.255>
   c. Specify the UDP port on the server that receives syslog messages:

      port <1–65535>
   d. Enter **exit** to exit the server context.

      The system switches to the system context (**config>system**).
3. Define syslog device parameters:
   a. Enter: **syslog device**

      The system switches to the syslog device context (**config>system>syslog**(device))
   b. Specify the module, task, or function from which syslog messages are sent:

      facility <local1–local7>

      Default: local1
   c. Specify the UDP port that transmits syslog messages:

      port <1–65535>

      Default: 514
   d. Specify the severity level. The log messages that contain severity level up to the specified level are transmitted:

      severity-level
      {critical|major|minor|warning|event|info|debug}
   e. Enable the transmitting of syslog messages:

      no shutdown

Displaying Syslog Statistics

➤ **To display syslog statistics:**

1. At the system context (**config>system**), enter: **syslog device**

   The system switches to the syslog device context (**config>system>syslog**(device))

2. Enter: **show statistics**.

3. Syslog statistics appear as shown in *Figure 4-9*. The counters are described in *Table 4-15*.

```
ETX-204A>config>system>syslog(device)# show statistics
Total Tx Messages          : 356
Non-queued Dropped Messages: 265
```

Figure 4-9. Syslog Statistics

Table 4-15. Syslog Statistic Parameters

Parameter	Description
Total Tx Messages	The total number of syslog messages transmitted
Non-queued Dropped Messages	The total number of syslog messages that were dropped before being queued

4.11 Configuring Temperature Threshold

You can define minimum and maximum temperature thresholds in order to receive trap notification that the device temperature has left the allowed range or returned to the allowed range. You can use a hysteresis mechanism to avoid sending an excessive amount of traps when a threshold is repeatedly crossed.

You can configure the minimum temperature, maximum temperature, hysteresis value (optional), and temperature unit (Celsius or Fahrenheit).

The hysteresis defines the margin around the temperature thresholds for sending trap notification of temperature threshold crossed:

- Trap notification of temperature too high is sent when the temperature rises above ‹maximum temperature + hysteresis value›
- After trap notification of temperature too high has been sent, the trap notification of temperature OK is sent when the temperature falls below ‹maximum temperature - hysteresis value›
- Trap notification of temperature too low is sent when the temperature falls below ‹minimum temperature - hysteresis value›
- After trap notification of temperature too low has been sent, the trap notification of temperature OK is sent when the temperature rises above ‹minimum temperature + hysteresis value›.

➤ To configure the temperature threshold:

1. Navigate to **configure chassis**.

   The **config>chassis#** prompt is displayed.

2. Type: **temperature-threshold** { **celsius** | **fahrenheit** } **min min-value max max-value** [**hysteresis hysteresis-value**].

   The temperature thresholds are set as specified.

For example:

➤ To define temperature thresholds:

- Minimum temperature = -20 degrees Celsius
- Maximum temperature = 50 degrees Celsius
- Hysteresis = 4.

```
ETX-204A# configure chassis
ETX-204A#config>chassis# temperature-threshold celsius min -20 max 50 hysteresis 4
ETX-204A# config>chassis#
```

4.12 Clearing Device Statistics

You can clear the statistics for Ethernet ports, flows, and OAM services.

➤ To clear the statistics:

- At the device prompt, enter **clear-statistics**.

  The statistics for Ethernet ports, flows, and OAM services are cleared.

For example:

```
ETX-204A# clear-statistics
ETX-204A#
```

4.13 Administration

Working with the Inventory

The ETX-204A inventory table displays the unit's components, hardware and software revisions, and power supply types. You can display an inventory table that shows all installed components, and you can display more detailed information for each component. You can configure an alias name, asset ID, and serial number for inventory components.

Standards and MIBs

The inventory feature is implemented according to RFC 4133 – Entity MIB (RFC 2737 was made obsolete by RFC 4133 version 3).

Benefits

You can monitor the installed components and hardware/software revisions.

Displaying Inventory Information

➤ **To display the inventory table:**

- At the **config>system#** prompt, enter **`show inventory-table`**.

  The inventory table is displayed (refer to *Example* to see a typical inventory table output).

You can display more information for each installed inventory component. To do so, you need to enter the **`inventory`** level with the corresponding inventory component index. *Table 4-16* shows the inventory component indices. As shown in the table, the component indices are fixed for the chassis, CPU, and power supply (if unit is 17.4"). For other components, the index is determined by the position of the corresponding row in the output of **`show inventory-table`**, therefore it changes according to what is installed in the unit.

Table 4-16. Inventory Component Index

Inventory Component	Index in 8.4" Unit	Index in 17.4" Unit
Chassis	1	1
CPU	2	2
Power Supply 1	3	3
Power Supply 2	Determined by position of corresponding row in **`show inventory-table`** output	4
Fan 1		Determined by position of corresponding row in **`show inventory-table`** output
Fan 2		
Temperature Sensor		
Network Port 1		
Network Port 2		
User Port 1		
User Port 2		
User Port 3		
User Port 4		
Management Ethernet		
External Clock		

➤ **To display the inventory component information:**

1. Navigate to **`configure system inventory`** <index>.
2. Enter **`show status`**.

   Information for the corresponding inventory component is displayed (refer to *Table 4-17* for information on the parameters).

Note *If you enter the* ***inventory*** *command with an index corresponding to a power supply that is not installed in the unit, a message is displayed stating that the entry instance doesn't exist.*

Table 4-17. Inventory Parameters

Parameter	Description
Description	Description of component type, in the form: **RAD.<device-name>.< Physical Class>**, e.g. **RAD.ETX-204A.Port**
Contained In	Index (from *Table 4-16*) of the component that contains the component for which information is being displayed. This is 0 for the chassis, as it is not contained in any component, and 1 for all other components, as they are all contained in the chassis.
Physical Class	Class of component Possible values: **Chassis**, **CPU**, **Power Supply**, **Fan**, **Sensor**, **Port**
Relative Position	Contains the relative position of this component among other similar components (with the exception of the relative positions for the chassis, management Ethernet port, and clock port). Possible values for the various component types: Chassis –**4294967295** CPU –**1** Power Supply – **1** or **2** Fan – **1** or **2** Temperature Sensor –**1** Network Port – **1** or **2** User Port –**3**, **4**, **5**, or **6** Management Ethernet – **101** External Clock –**301**
Name	Name of component Possible values (according to component type): **<device-name> –Chassis** **CPU** **Power Supply <n>** **Fan <n>** **Temperature Sensor** **Network Port <n>** **User Port <n>** **Management Ethernet** **External Clock**
HW Rev	Hardware revision (relevant only for chassis)
SW Rev	Software revision (relevant only for chassis)
FW Rev	Firmware revision (relevant only for chassis)
Serial No.	Serial number (blank if unknown for component)
MFG Name	Manufacturer name (blank if unknown for component)
Model Name	Model name (blank if unknown for component)
Alias	Alias name for component
Asset ID	Identification information for component

Parameter	Description
FRU	Indicates whether this component is a field replaceable unit that can be replaced on site. For ETX-204A this is normally true only for the chassis, and for the power supplies in the 17.4-inch unit.

Setting Administrative Inventory Information

If necessary, you can configure the alias, asset ID and serial number for inventory components. To configure the information, you need to enter the **`inventory`** level with the corresponding inventory component index as specified in *Table 4-16*.

➤ **To set inventory component information:**

1. Navigate to **`configure system inventory`** <index>.

   The **`config>system>inventor`**(<index>)# prompt is displayed.

2. Enter all necessary commands according to the tasks listed below.

Task	Command	Comments
Assigning user-defined alias to component	**alias** ‹string›	Using **no** before **`alias`** removes the alias. ***Note:*** *Configuring the alias is meaningful only for the chassis component. It can be used by a network manager as a non-volatile identifier for the device.*
Assigning user-specific asset identifier to the component (usually for removable physical components)	**asset-id** ‹id›	Using **no** before **`asset-id`** removes the asset ID.
Assigning vendor-specific serial number to the component	**serial-number** ‹string›	Using **no** before **`serial-number`** removes the serial number.

Example

➤ **To display the following inventory information:**

- Inventory table
- Inventory information for the following components:
  - Chassis (index 1)
  - Power Supply 1 (index 3)
  - Temperature Sensor (index 7)
  - User Port 1 (index 10).

```
ETX-204A# configure system
ETX-204A# config>system# show inventory-table
Physical ClassName                    HW Rev SW Rev    FW Rev
-------------------------------------------------------------------------
Chassis       ETX-204A-HAC – Chass   2.00  2.20       1.3.0.0.0.0.1.1
Power Supply  Power Supply 1
Power Supply  Power Supply 2
Fan           Fan 1
Fan           Fan 2
Port          Network Port 1
Port          Network Port 2
Port          User Port 1
Port          User Port 2
Port          User Port 3
Port          User Port 4
Port          Management Ethernet
Port          External Clock

ETX-204A>config>system# inventory 1
ETX-204A>config>system>inventor(1)# show status
Description       : RAD.ETX-204A.Chassis
Contained In      : 0
Physical Class    : Chassis
Relative Position : 4294967295
Name              : ETX-204A - Chassis
HW Rev            : 2.00
SW Rev            : 2.20b05
FW Rev            : 1.3.0.0.0.0.1.24
Serial Number     : 00-20-D2-30-CC-9D
MFG Name          : RAD
Model Name        :
Alias             :
Asset ID          :
FRU               : True

ETX-204A>config>system>inventor(1)# exit
ETX-204A >config>system# inventory 3
ETX-204A>config>system>inventor(3)# show status
Description       : RAD.ETX-204A.Power Supply
Contained In      : 1
Physical Class    : Power Supply
Relative Position : 1
Name              : Power Supply 1
HW Rev            :
SW Rev            :
FW Rev            :
Serial Number     :
MFG Name          : RAD
Model Name        :
Alias             :
Asset ID          :
FRU               : True

ETX-204A>config>system>inventor(3)# exit
```

```
ETX-204A>config>system# inventory 7
ETX-204A>config>system>inventor(7)# show status
Description       : RAD.ETX-204A.Temperature Sensor
Contained In      : 1
Physical Class    : Sensor
Relative Position : 1
Name              : Temperature Sensor
HW Rev            :
SW Rev            :
FW Rev            :
Serial Number     :
MFG Name          : RAD
Model Name        :
Alias             :
Asset ID          :
FRU               : False

ETX-204A>config>system>inventor(7)# exit
ETX-204A>config>system# inventory 10
ETX-204A>config>system>inventor(10)# show status
Description       : RAD.ETX-204A.Port
Contained In      : 1
Physical Class    : Port
Relative Position : 3
Name              : User Port 1
HW Rev            :
SW Rev            :
FW Rev            :
Serial Number     :
MFG Name          :
Model Name        :
Alias             :
Asset ID          :
FRU               : False

ETX-204A>config>system>inventor(10)# exit
ETX-204A>config>system#
```

➤ To set the chassis alias to "ETX-test-unit":

```
ETX-204A# configure system
ETX-204A>config>system# inventory 1
ETX-204A>config>system>inventor(1)# alias ETX-test-unit
ETX-204A>config>system>inventor(1) show status
Description       : RAD.ETX-204A.Chassis
Contained In      : 0
Physical Class    : Chassis
Relative Position : 4294967295
Name              : ETX-204A - Chassis
HW Rev            : 2.00
SW Rev            : 2.20b05
FW Rev            : 1.3.0.0.0.0.1.24
Serial Number     : 00-20-D2-30-CC-9D
MFG Name          : RAD
Model Name        :
Alias             : ETX-test-unit
Asset ID          :
FRU               : True

ETX-204A>config>system>inventor(1)# exit
```

Displaying Environment

You can display information about the type and status of the power supplies, the status of the fans, and the temperature sensor.

➤ To display the information:

1. Navigate to **`configure chassis`**.

   The **`config>chassis#`** prompt is displayed.

2. Enter:
   `show environment`.

   The information is displayed as shown in the example below.

   The power supply type is indicated as AC, DC, or **--** (if it is absent or has failed).

   The status for the power supplies and fans indicates whether the unit is present and functioning properly, or is absent (does not exist), or has failed.

   The temperature sensor status indicates the temperature, and whether the sensor is functioning correctly.

For example:

```
ETX-204A# configure chassis
ETX-204A>config>chassis# show environment
Power Supply   Type      Status
------------------------------------------------------------------------
1              AC        OK
2              --        Not exist

FAN                      Status
------------------------------------------------------------------------
1                        OK
2                        OK

Sensor    Value                          Status
------------------------------------------------------------------------
1.        32             Celsius        OK

ETX-204A>config>chassis#
```

Displaying Software Versions

You can display the active, main, and backup software file versions, dates, and times.

➤ To display the versions:

- At the **file#** prompt enter: **show version**.

For example:

```
ETX-204A# file
ETX-204A>file# show version
Active : 2.20  21/07/2009 15:41:46
Main   : 2.20  21/07/2009 15:41:46
Backup : 2.20d01 31/03/2009 22:19:34
ETX-204A>file#
```

Displaying CPU and Memory Utilization

You can view the CPU and memory buffer usage. Refer to *Table 4-18* for a description of the memory buffers.

➤ To display CPU usage:

- From the system context (**config>system**), enter **show cpu-utilization.**

  The CPU usage is displayed.

```
ETX-204A>config>system# show cpu-utilization
CPU Utilization
-------------------------------------------------------------
Min (%) : 26    Cur (%) : 26     Max (%) : 66

ETX-204A>config>system#
```

Figure 4-10. CPU Usage

➤ To display memory buffer usage:

- From the system context (**config>system**), enter **show buffers.**

  The memory buffer usage is displayed.

```
ETX-204A>config>system# show buffers
Name     Size    Total Buffers   Free Buffers  Alloc. Failures   Free Failures
        (Bytes)
-------------------------------------------------------------------------------
VLAN      64        100              99               0                0
Huge      8192      100              100              0                0
Large     2048      1000             796              0                0
Medium    512       4000             3975             0                0
Small     64        4000             3979             0                0
Queue     16        8000             8000             0                0
```

Figure 4-11. Memory Buffer Usage

Table 4-18. Memory Buffers

Buffer	Size	Total Buffers Available	Purpose
VLAN	64	100	Unused, except three of the buffers are used for internal functions
Huge	8192	100	Unused
Large	2048	1000	OAM CFM and OAM EFM
Medium	512	4000	Event log and traps
Small	64	4000	Management traffic
Queue	16	8000	Application task messages

File Operations

You can perform the following operations:

- Transfer files via SFTP
- Copy files within the ETX-204A unit
- Display files
- Swap files
- Delete files.

You can copy files via the **copy** command, or via the commands shown in *Table 4-19*. As shown in the table, some commands that reset the device also erase the saved user configuration by copying another file to it before the reset.

Table 4-19. Commands That Copy Files

Command	Level	Copies...	Additional Actions	Manual Section
`factory-default`	`admin`	factory-default to startup-config	Unit resets after copying	*Resetting to Factory Defaults*
`user-default`	`admin`	user-default-config to startup-config	Unit resets after copying	*Resetting to User Defaults*
`save`	`global`	running-config to startup-config	None	*Saving Configuration*

Downloading/Uploading Files

You can download or upload files to the ETX-204A unit via SFTP. Normally the types of files copied are configuration files and software files.

The software files can also be downloaded to ETX-204A via the Boot Manager, using XMODEM or TFTP. For details on upgrading the device software, refer to *Chapter 6*.

Note *TFTP is available only when downloading a software image via the Boot Manager. When you copy files with the* ***copy*** *command, you have to use SFTP.*

SFTP Application

The SFTP protocol is used to provide secure file transfers via the product's Ethernet interface. SFTP is a version of FTP that encrypts commands and data transfers, keeping your data secure and your session private. For SFTP file transfers, an SFTP server application must be installed on the local or remote computer.

A variety of third-party applications offer SFTP server software. For more information, refer to the documentation of these applications.

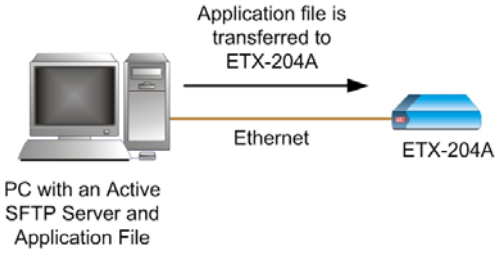


Figure 4-12. Downloading a Software Application File via SFTP

Setting up SFTP Server

If you use a local laptop and SFTP is the preferred transfer method, a SFTP server application must be installed on it.

As mentioned above, third-party applications are available and you should refer to their setup documentation.

Checking the Firewall Settings

SFTP file transfers are carried out through TCP port 22. You should check that the firewall you are using on the server computer allows communication through this port.

➤ **To allow communication through port 22 in Windows XP:**

1. Double-click the **My Network Places** icon, located on the desktop.

   The My Network Places window appears.

2. On the Network Tasks sidebar, click View network connections.

   The available network connections are displayed.

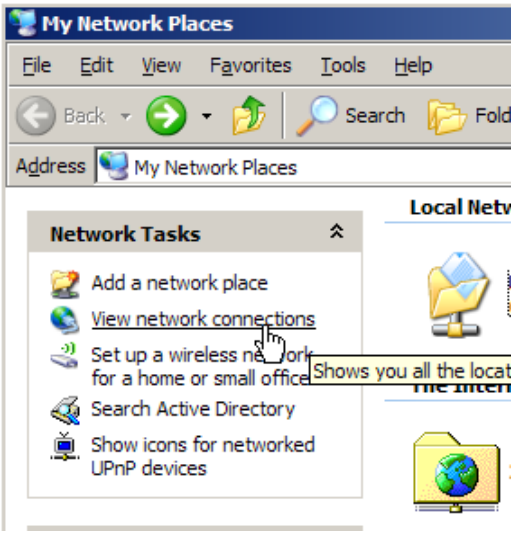


Figure 4-13. Viewing Network Connections

3. On the Network Tasks sidebar, click **Change Windows Firewall settings**.

   The Windows Firewall dialog box appears.

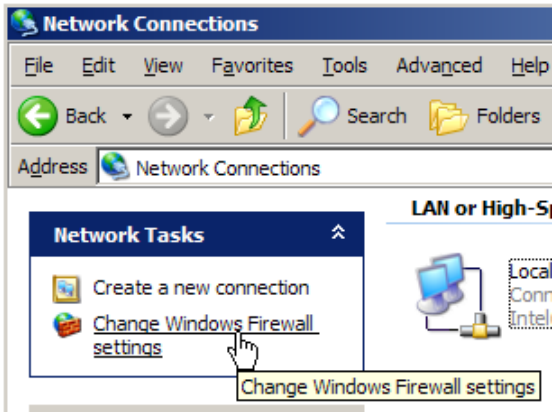


Figure 4-14. Changing Firewall Settings

4. Click the **Exceptions** tab.

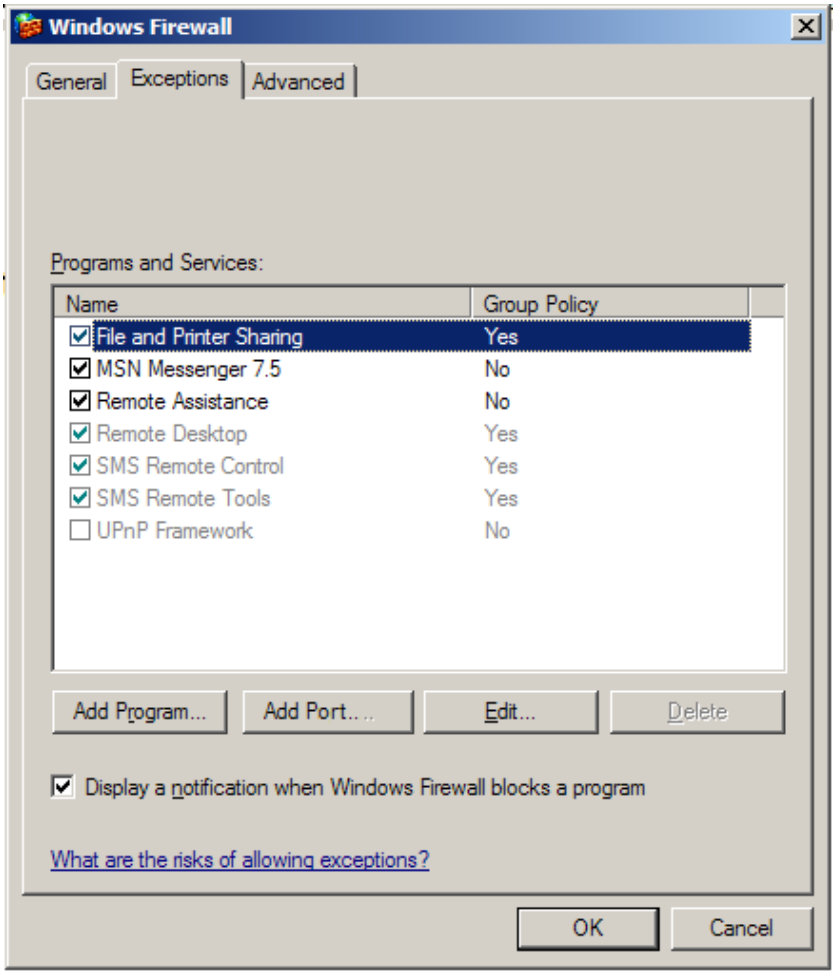


Figure 4-15. Windows Firewall Dialog Box – Exceptions Tab

5. Check whether port 22 appears on the exceptions list. If it does not, click **Add Port** and add it to the list of exceptions.

Note *Different firewall types require different configuration. Refer to your firewall's documentation to check how SFTP file transfers can be allowed to pass through it using TCP port 22.*

Using CLI to Download/Upload Files

You use the **copy** command in the **file** context to download/upload files.

➤ **To download a file via SFTP:**

- At the **file#** prompt, enter:
  copy
  sftp://<user>:<password>@<sftp-server-ip-addr>/<source-file>
  <destination-file>.

For example:

- SFTP server address – 192.20.20.20
- SFTP user name – admin

- SFTP password – 1234
- Source file name – **ETX-204A.img**
- Destination file name – **ETX-204A.img**.

```
ETX-204A# file
ETX-204A>file# copy sftp://<admin>:<1234>@192.20.20.20/ETX-204A.img ETX-204A.img
```

➤ **To upload a file via SFTP:**

- At the **file#** prompt, enter:
  copy <source-file>
  sftp://<user>:<password>@<sftp-server-ip-addr>/<dest-file>.

For example:

- SFTP server address – 192.20.20.20
- SFTP user name – admin
- SFTP password – 1234
- Source file name – **db1conf.log**
- Destination file name – **db1conf.cfg**.

```
ETX-204A# file
ETX-204A>file# copy db1conf.log sftp://<admin>:<1234>@192.20.20.20/db1conf.cfg
```

Copying Files Within Device

You can copy files within the ETX-204A unit with the copy command.

➤ **To copy files within the device:**

- At the **file#** prompt, enter:
  copy <source-file> <dest-file>.

For example:

- Source file name – **running-config**
- Destination file name – **startup-config**.

```
ETX-204A# file
ETX-204A>file# copy running-config startup-config
```

Displaying Files Within Device

The **dir** command is used to display the files within the device.

➤ **To display the files:**

- At the **file#** prompt, enter: **dir**.

  A list of the file names and types is displayed.

For example:

```
ETX-204A# file
ETX-204A>file# dir
Type           Name
-------------------------------------------------------------
Software       backup-sw
Software       main-sw
Configuration  factory-default
Configuration  startup-config
Configuration  user-default-config
Event Log      logfile
```

Swapping Files

You can swap files, via SFTP or locally.

➤ To swap the files:

- At the **file#** prompt, enter the swap command in one of the following forms, according to where the files are located.

Task	Command	Comments
Swap ‹file1› from SFTP server with ‹file2› located on device	**swap** **sftp**://<user>:<password>@<sftp-server-ip-addr>/<file1> <file2>	
Swap ‹file1› located on device with ‹file2› from SFTP server	**swap** <file1> **sftp**://<user>:<password>@<sftp-server-ip-addr>/<file2>	
Swap ‹file1› located on device with ‹file2› located on device	**swap** <file1> <file2>	

Deleting Files

You can delete files. Before deleting the file, make sure the file is not in use.

➤ To delete a file:

1. At the **file#** prompt, enter: **delete** <file-name>.

   You are prompted to confirm the deletion.

2. Confirm the deletion.

For example:

```
ETX-204A# file
ETX-204A>file# delete db2conf.cfg
File will be erased. Are you sure?? [yes/no] _yes
```

Saving Configuration

You must save your configuration if you wish to have it available, as it is not saved automatically. You can save your configuration as follows:

- To save the user configuration in **startup-config**:
  - In any level enter: **save**
  - At the **file#** prompt enter:
    copy running-config startup-config.
- To save the user default configuration in **user-default-config**, at the **file#** prompt enter:
  copy running-config user-default-config.

Reset

ETX-204A supports the following types of reset:

- Reset to factory defaults
- Reset to user defaults
- Overall reset (restart) of the device.

Resetting to Factory Defaults

➤ **To reset ETX-204A to factory defaults:**

1. Navigate to the admin context (**admin**) and enter **factory-default**.

   A confirmation message is displayed:
   Current configuration will be erased and device will reboot with factory default configuration. Are you sure?? [yes/no]

2. Enter **yes** to confirm the reset to factory defaults.

   The **factory-default** file is copied to the **startup-config** file. The unit resets, and after it completes its startup the factory defaults are loaded.

Resetting to User Defaults

➤ **To reset ETX-204A to user defaults:**

1. Navigate to the admin context (**admin**) and enter **user-default**.

   A confirmation message is displayed:
   Current configuration will be erased and device will reboot with user default configuration. Are you sure?? [yes/no]

2. Enter **yes** to confirm the reset to user defaults.

   The **user-default-config** file is copied to the **startup-config** file. The unit resets, and after it completes its startup the user defaults are loaded.

Restarting the Unit

If necessary, you can restart ETX-204A without interrupting the power supply.

➤ To restart ETX-204A:

1. Navigate to the admin context (**admin**) and enter **reboot**.

   A confirmation message is displayed:
   Device will reboot. Are you sure?? [yes/no]

2. Enter **yes** to confirm the reset.

   The unit restarts.

Chapter 5

Monitoring and Diagnostics

The following are described in this chapter:

- Detecting problems
- Alarms and traps
- Performing diagnostic tests.

5.1 Detecting Problems

The LED indicators indicate errors on the hardware level.

LEDs

If an LED is red, that usually indicates there is a problem. Check the port that is associated with the LED to further investigate the problem. Refer to *Chapter 3* for a description of the unit LEDs.

Alarms and Traps

Errors can be indicated by events and traps. An event is an error report that is written in the event log. A trap is an error report that is sent to a management station. Refer to *Handling Events* for further details on events and traps.

5.2 Handling Events

ETX-204A maintains a log file that can hold up to 2084 events (system messages). All events are time-stamped.

Working with the Event Log

This section explains how to display and clear the event log.

➤ To display the event log:

1. Navigate to the **`system`** context.

2. Display the event log:

   `show event-log`

   To scroll up and down in the list, use the arrow keys. The events are listed in *Table 5-1*.

➤ **To clear the event log:**

- At the **`system`** context, enter:

  `clear-event-log`.

Table 5-1. Event List

System Events	Description
CLI TEXT FILE ERROR: {STARTUP-CONFIG FILE/ USER-DEFAULT-CONFIG FILE}	An error occurred while attempting to load the specified configuration file. When this error occurs, the file is deleted and the unit reboots.
COLD START	The unit has rebooted
DYING GASP	The unit lost power and sent indication of dying gasp
FAN {1,2} ON	The specified fan is on
FAN {1,2} OFF	The specified fan is off
FATAL ERROR AT MODULE X, LINE X	Fatal error has been detected at the specified location
INVALID LOGIN VIA (TELNET/TERMINAL/SSH)	Invalid user name and/or password has been detected while initializing the Telnet/terminal/SSH management session
LOGIN VIA (TELNET/TERMINAL/SSH)	Login has been performed via Telnet/terminal/SSH application
POWER SUPPLY {1,2} ON	The specified power supply is on
POWER SUPPLY {1,2} OFF	The specified power supply is off because it has failed or is absent
SYSTEM USER RESET	System reset occurred due to user request or as a result of configuration download
TEMPERATURE XX[C] IS OK	The internal temperature has returned to the allowed range after being too low or too high
TEMPERATURE XX[C] IS TOO HIGH	The internal temperature has risen above the upper allowed threshold
TEMPERATURE -XX[C] IS TOO LOW	The internal temperature has fallen below the lower allowed threshold
Clock Selection Events	**Description**
SOURCE CLOCK {sourceId} STATUS SET TO {OK/ MONITORING FAILED/ PHY FAILED/ ESMC FAILED}	The source clock status has changed as specified
STATION OUT SOURCE SET TO {LOCKED/UNLOCKED} STATE	The station clock output has changed as specified

SYSTEM CLOCK USING {INTERNAL SOURCE/ SOURCE 1/ SOURCE 2} AND SET TO {AUTOMATIC/ FREERUN/ HOLDOVER/ LOCKED/ PRELOCKED2/ PRELOCKED/ LOSS OF LOCK} STATE	The system clock status has changed as specified, due to change in system clock selection or system clock state

File Transfer Events	**Description**
IMAGE/CONFIGURATION DOWNLOAD/UPLOAD	SFTP/TFTP session has been initiated for download/upload action with image/configuration file
DOWNLOAD/UPLOAD OK	SFTP/TFTP download/upload session has successfully completed
DOWNLOAD/UPLOAD FAILED/FILE REJECTED	SFTP/TFTP session has failed because the download/upload failed or the file was rejected

Physical Port Events	**Description**
LINK DOWN {PORT X/ STATION PORT}	Network/user Ethernet port or station clock has been disconnected
LINK UP {PORT X/ STATION PORT}	Network/user Ethernet port or station clock has been connected
LINK ADMIN DOWN {PORT X/ STATION PORT}	Network/user Ethernet port or station clock has been disabled by the user
SFP INSTALLED PORT X	SFP has been inserted in specified Ethernet port
SFP REMOVED PORT X	SFP has been removed from specified Ethernet port

DHCP Events	**Description**
IP X.X.X.X ASSIGNED BY SERVER Y.Y.Y.Y	IP address X.X.X.X has been assigned by DHCP server Y.Y.Y.Y
IP X.X.X.X IS RELEASED	IP address X.X.X.X has been released by ETX-204A

OAM CFM Events	**Description**
OAM CC OK ON	OAM.ag connectivity check (CC) with remote MEP has been confirmed
OAM CC MISMERGE ON	OAM.ag CC mismerge for remote MEP has been detected
OAM CC UNEXPECTED MEP ON	OAM.ag CC unexpected MEP for remote MEP has been detected
OAM CC UNEXPECTED MEP OFF	OAM.ag CC unexpected MEP for remote MEP event has been canceled
OAM CC UNEXPECTED PERIOD ON	OAM.ag CC unexpected period for remote MEP has been detected
OAM CC LOSS OF CONTINUITY	OAM.ag CC continuity loss has been detected for remote MEP
OAM CC RDI DETECTED ON	OAM.ag CC RDI for remote MEP has been detected
OAM UNEXPECTED MD LEVEL ON	OAM.ag CC unexpected MD level has been detected
OAM UNEXPECTED MD LEVEL OFF	OAM.ag CC unexpected MD level event has been canceled

OAM CFM Service Events	**Description**
FRAMES ABOVE DELAY DROPPED BELOW	Y.1731 Frame Delay Threshold has been reached (dropped below)
FRAMES ABOVE DELAY EXCEEDED	Y.1731 Frame Delay Threshold has been reached (exceeded)

FRAMES ABOVE DELAY VARIATION DROPPED BELOW	Y.1731 Frame Delay Variation Threshold has been reached (dropped below)
FRAMES ABOVE DELAY VARIATION EXCEEDED	Y.1731 Frame Delay Variation Threshold has been reached (exceeded)
FRAMES LOSS RATIO DROPPED BELOW	Y.1731 Frame Loss Ratio Threshold has been reached (dropped below)
FRAMES LOSS RATIO EXCEEDED	Y.1731 Frame Loss Ratio Threshold has been reached (exceeded)
UNAVAILABILITY RATIO DROPPED BELOW	Y.1731 Unavailability Ratio Threshold has been reached (dropped below)
UNAVAILABILITY RATIO EXCEEDED	Y.1731 Unavailability Ratio Threshold has been reached (exceeded)
OAM EFM Events	**Description**
OAM (802.3ah) REMOTE DYING GASP PORT X	Dying gasp indication has been received from the remote partner on OAM link on port X
OAM (802.3ah) CONNECTIVITY FAIL PORT X ON	OAM connectivity has been lost on port X
OAM (802.3ah) CONNECTIVITY FAIL PORT X OFF	OAM connectivity has been restored on port X
OAM (802.3ah) REMOTE LINK FAIL PORT X ON	Indication of OAM connectivity failure has been received from the remote partner on OAM link on port X
OAM (802.3ah) REMOTE LINK FAIL PORT X OFF	Indication of OAM connectivity recovery has been received from the remote partner on OAM link on port X
OAM (802.3ah) REMOTE CRITICAL ERRORS PORT X ON	Indication of critical errors has been received from the remote partner on OAM link on port X
OAM (802.3ah) REMOTE CRITICAL ERRORS PORT X OFF	Indication of critical error termination has been received from the remote partner on OAM link on port X
OAM (802.3ah) REMOTE LOOPBACK PORT X ON	Indication of remote loopback activation has been received from the remote partner on OAM link on port X
OAM (802.3ah) REMOTE LOOPBACK PORT X OFF	Indication of remote loopback deactivation has been received from the remote partner on OAM link on port X

Working with Traps

The traps are listed in the following table.

Table 5-2. Trap List

Trap	Description	OID	Maskable
agnDyingGaspTrap	A power failure (dying gasp) has occurred	1.3.6.1.4.1.164.6.1.0.36	Yes
agnFanFailureTrap	A fan is on or off	1.3.6.1.4.1.164.6.1.0.14	Yes

Trap	Description	OID	Maskable
agnPowerFailureTrap	A power failure has occurred or a power supply status has changed	1.3.6.1.4.1.164.6.1.0.13	Yes
agnStatusChangeTrap	SNMP agent status has changed	1.3.6.1.4.1.164.6.1.0.2	Yes
agnTempThresholdTrap	The device temperature has left the allowed range, or has returned to the allowed range	1.3.6.1.4.1.164.6.1.0.37	Yes
agnUploadDataTrap	Data sent to generic Intervals Statistics Collection application	1.3.6.1.4.1.164.6.1.0.11	Yes
authenticationFailure	There was an attempt to access the device with the wrong SNMP community	1.3.6.1.6.3.1.1.5.5	Yes
coldStart	The unit has been restarted	1.3.6.1.6.3.1.1.5.1	Yes
csmDomainStateChange	The system clock selection has changed to Internal Source/ Source 1/ Source 2, or system clock status has changed to Automatic/ Freerun/ Holdover/ Locked/ Prelocked2/ Prelocked/ Loss Of Lock	1.3.6.1.4.1.164.6.1.0.33	Yes
csmDomainStationStateChange	The station clock output state has been set to Locked/ Unlocked	1.3.6.1.4.1.164.6.1.0.34	Yes
csmSourceStatusChange	The source clock status has been set to OK/ Monitoring Failed/ PHY Failed/ ESMC Failed	1.3.6.1.4.1.164.6.1.0.35	Yes
dot3OamOperStatusChange	OAM (802.3ah) connectivity has been lost or restored	1.3.6.1.4.1.164.3.1.6.1.6.0.1	Yes
dot3OamPeerEvent	One of the following OAM (802.3ah) indications has been received from remote partner: Connectivity failure Connectivity recovered Critical error started Critical error ended Dying gasp	1.3.6.1.4.1.164.3.1.6.1.6.0.2	Yes
ethOamCfmDefectCondition	One of the following OAM CFM conditions has occurred: Failure Mismerge Unexpected MEP Unexpected MD level Unexpected period RDI OK Not applicable	1.3.6.1.4.1.164.3.1.6.1.3.0.1	Yes

Trap	Description	OID	Maskable
failedLogin	Failed login to ETX-204A has occurred	1.3.6.1.4.1.164.6.1.0.25	Yes
fallingAlarm	An RMON falling event has been triggered, by dropping below one of the following Y.1731 thresholds: Frame Delay Frame Delay Variation Frame Loss Ratio Unavailability Ratio	1.3.6.1.2.1.16.0.2	Yes
linkDown	Network or user Ethernet port has been disconnected	1.3.6.1.6.3.1.1.5.3	Yes
linkUp	Network or user Ethernet port has been connected	1.3.6.1.6.3.1.1.5.4	Yes
prtStatusChangeTrap	An SFP has been inserted into or removed from one of the ports	1.3.6.1.4.1.164.6.1.0.3	Yes
risingAlarm	An RMON rising event has been triggered, by exceeding one of the following Y.1731 thresholds: Frame Delay Frame Delay Variation Frame Loss Ratio Unavailability Ratio	1.3.6.1.2.1.16.0.1	Yes
successfulLogin	Successful login to ETX-204A has occurred	1.3.6.1.4.1.164.6.1.0.24	Yes
tftpStatusChangeTrap	TFTP session status has changed, one of the following has occurred: Connecting Transferring data Ended with timeout Ended OK error	1.3.6.1.4.1.164.6.1.0.1	Yes

Setting the Trap Delay

You can configure a delay before the ETX-204A device sends traps.

➤ To set trap delay:

1. Navigate to **`configure management snmp`**.
2. Enter the delay in seconds:
   `trap-delay` `<0-150>`.

   Traps are sent with the specified delay.

Masking Traps

You can mask traps to prevent them from being sent to all management stations.

Note *You can also mask all traps to a specific management station. For details refer to* Chapter 4.

➤ To mask traps to all network managers:

1. Navigate to **`configure management snmp`**.

   The **`config>mngmnt>snmp#`** prompt is displayed.

2. Enter:
   `trap-mask` `{all | cold-start | authentication-failure | link-up-down | tftp-sftp-status | agent-status | port-status | upload-data | power-failure | login-successful | login-failure | cfm-defect-condition | dying-gasp | configuration-changed | temperature-threshold | fan-failure | link-oam-connectivity-fail | link-oam-remote-loopback | link-oam-remote-critical | link-oam-remote-link | link-oam-remote-dying-gasp | system-clock-state | clock-station-state | clock-source-status}`.

   The specified trap is not sent to any network managers.

Note

- *To mask all the traps, enter* ***`trap-mask all`***
- *To unmask all the traps, enter* ***`no trap-mask all`*** *or* ***`no trap-mask`***
- *To unmask a specific trap, enter* ***`no trap-mask`*** *`{trap-name}` where trap-name is one of the traps specified above.*

Working with Trap Synchronization

You can add network managers (SNMPv1) or target manager stations (SNMPv3) to groups for trap synchronization. Traps are sent to the groups with sequence IDs to allow the managers to detect when traps have been lost, and request that traps be sent again.

Note

- *A trap synchronization group can contain managers of only one type, e.g. you cannot mix SNMPv1 and SNMPv3 managers in a group*
- *A manager cannot belong to more than one group*
- *The trap masking must be the same for all managers in a group.*

Adding Network Managers to Trap Synchronization Group

➤ To add a network manager to a trap synchronization group:

1. Navigate to **`configure management manager`**`(<manager-ip-address>/`**`32`**`)`.

   The **`config>mngmnt>manager`**`(<manager-ip-address>/`**`32`**`)#` prompt is displayed.

2. Enter **`trap-sync-group`** `<group-id> [`**`import-trap-masking`**`]`.

   The manager is added to the specified group. If the group does not exist, it is created. If you specify the **`import-trap-masking`** parameter, the manager's trap masking is imported from the first manager in the group.

Note *To remove the manager from the group, enter* ***no trap-sync-group*** *<group-id>. If the manager was the last in the group, the group is deleted.*

Adding Target Manager Stations to Trap Synchronization Group

➤ To add a target manager station to a trap synchronization group:

1. Navigate to **configure management snmp target**(<target-name>).

   The **config>mngmnt>snmp>target**(<target-name>)**#** prompt is displayed.

2. Enter **trap-sync-group** <group-id> [**import-trap-masking**].

   The manager is added to the specified group. If the group does not exist, it is created. If you specify the **import-trap-masking** parameter, the manager's trap masking is imported from the first manager in the group.

Note *To remove the manager from the group, enter* ***no trap-sync-group*** *<group-id>. If the manager was the last in the group, the group is deleted.*

Configuring Trap Synchronization Masking (SNMPv1)

If a group contains SNMPv1 managers, you can configure the trap masking of the group.

➤ To configure trap masking:

1. Navigate to **configure management trap-sync-group** <group-id>.

   The **config>mngmnt>trap-sync-group**(<group-id>)**#** prompt is displayed.

2. To mask or unmask traps:

   - To mask all traps, enter **trap-mask all**.

     All traps are masked for the group.

   - To unmask all traps, enter **no trap-mask**.

     All traps are unmasked for the group.

Configuring Trap Synchronization Target Parameters and Tags (SNMPv3)

If a group contains SNMPv3 managers, you can configure the target parameters and tag list for the group. Refer to *Chapter 4* for information on target parameters and tags.

➤ To specify a set of target parameters:

1. Navigate to **configure management trap-sync-group** <group-id>.

   The **config>mngmnt>trap-sync-group**(<group-id>)**#** prompt is displayed.

2. Enter **target-params** <target-param-name>.

   The specified set of target parameters is assigned to the group.

➤ To specify tags:

1. Navigate to **configure management trap-sync-group** <group-id>.

   The **config>mngmnt>trap-sync-group**(<group-id>)**#** prompt is displayed.

2. Enter **tag-list** <tag-list>.

   The specified list of tags is assigned to the group.

Note *To remove the tag list, enter* ***no tag-list****.*

Displaying Trap Synchronization Information

You can display the trap synchronization information.

➤ To display trap synchronization information:

1. If SNMPv3 is enabled, navigate to **configure management snmp** otherwise navigate to **configure management**.

   The **config>mngmnt#** or **config>mngmnt>snmp#** prompt is displayed respectively.

2. Enter **show trap-sync**.

   The trap synchronization information is displayed.

5.3 Running a Ping Test

You can ping a remote IP host to check the ETX-204A IP connectivity with that host.

➤ To ping an IP host:

1. In any level, start pinging the desired host specifying its IP address and optionally the number of packets to send:

   ping <1.1.1.1–255.255.255.255> [number-of-packets <0–50>]

2. To stop the ping test, enter **no ping**.

5.4 Tracing the Route

This diagnostic utility traces the route through the network from ETX-204A to the destination host. The trace route utility supports up to 30 hops.

➤ To trace a route:

- In any level, start the trace route and specify the IP address of the host to which you intend to trace route:

  trace-route <1.1.1.1–255.255.255.255>

5.5 Technical Support

Technical support for this product can be obtained from the local distributor from whom it was purchased.

For further information, please contact the RAD distributor nearest you or one of RAD's offices worldwide. This information can be found at www.rad.com (offices – About RAD > Worldwide Offices; distributors – Where to Buy > End Users).

Chapter 6

Software Upgrade

This chapter explains how to upgrade ETX-204A to software version 2.2.

Software upgrade is required to fix product limitations, enable new features, or to make the unit compatible with other devices that are already running the new software version.

ETX-204A stores two software versions, each of them in one of the two 2.56 MB partitions of its flash memory, which also contains a boot program. The software is stored in compressed format. The main version is decompressed and loaded into the ETX-204A RAM upon power-up. The backup software is kept for backup purposes. If the main software becomes corrupted, you can swap it with the backup. By default, ETX-204A is delivered with active software only.

New software releases are distributed as ***.img** files, to be downloaded to ETX-204A. When starting a download, ETX-204A erases the current backup and places the new software in the backup partition. When downloading is complete, the unit checks the integrity of the new software file. If it is correct, the backup and active files are swapped. The new software release becomes active and the former active software becomes the backup. If a failure occurs during downloading, the new version is erased. In this case, only one version is left stored in the flash memory. The backup software can be downloaded to the unit and swapped with the main software later.

The information in this chapter includes the following:

- Detailed conditions required for the upgrade
- Any impact the upgrade may have on the system
- Overview of downloading options
- Upgrade via the File Copy command
- Upgrade via the Boot menu.

Note *Sometimes you may find it necessary to downgrade by downloading an older software version to the ETX-204A. In this case the procedures described in this section can be used to download the software image.*

*When you downgrade the software, the device configuration cannot be preserved. You must format the flash via the boot menu (*Figure 6-3*) before downloading the earlier software version.*

6.1 Compatibility Requirements

Following are the software releases that can be upgraded to version 2.2, as well as the hardware revisions that can accept the software version 2.2.

- Software –Ver.=2.0
- Hardware – 1.0 and above.

6.2 Impact

ETX-204A continues operating with the previous software version until you manually reset the unit.

6.3 Software Upgrade Options

Application software can be downloaded to ETX-204A via SFTP, using the File Transfer command (File Copy), or via XMODEM or TFTP, using the boot menu.

6.4 Prerequisites

This section lists the software file names and outlines system requirements needed for the upgrade procedure.

Software Files

The version 2.2 release file is distributed as a software file with a name similar to=etx204A_2_20.IMG. The image file (and exact name) can be obtained from the local RAD business partner from whom the device was purchased.

System Requirements

Before starting the upgrade, verify that you have the following:

- For upgrade via SFTP/TFTP:
  - Operational ETX-204A unit with valid IP parameters configured for the host
  - Connection to a PC with a SFTP/TFTP server application and a valid IP address
  - Software image file stored on the PC
- For upgrade via XMODEM:
  - Operational ETX-204A unit
  - Connection to a PC via HyperTerminal
  - Software image file stored on the PC.

6.5 Upgrading the Device Software via CLI

The recommended software downloading method is to use the file copy command.

Network administrators can use this procedure to distribute new software releases to all the managed ETX-204A units in the network from a central location.

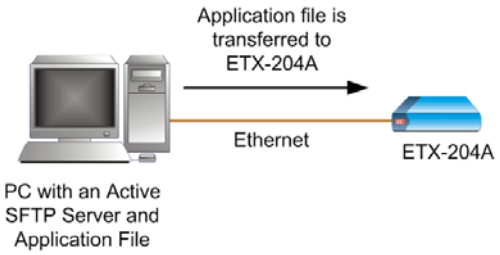


Figure 6-1. Downloading a Software Application File via SFTP

Use the following procedure to download software release 2.2 to ETX-204A via CLI.

1. Verify that the image file is stored on the PC with the SFTP server application.
2. Verify that the ETX-204A host has valid IP parameters.
3. Ping the PC to verify the connection.
4. Activate the SFTP server application.
5. Download the image file from the PC to ETX-204A.

Note *Configuration values shown in this chapter are examples only.*

Verifying the Host Parameters

In order to be able to establish communication with the SFTPTFTP server, the ETX-204A host must have host IP parameters configured according to your network requirements. In addition, flows must be defined to and from the ETX-204A host. Refer to the following manual sections for additional information:

- *Connecting to ASCII Terminal* in Chapter 2
- *Working with Terminal* in Chapter 3
- *Configuring the Host IP Settings* in Chapter 4.

Pinging the PC

Check the integrity of the communication link between ETX-204A and the PC by pinging the PC from ETX-204A.

➤ **To ping the PC:**

1. In any level, start pinging the PC specifying its IP address and optionally the number of packets to send:

ping <ip-address> [**number-of-packets** <num-packets>]

A reply from the PC indicates a proper communication link.

2. If the ping request times out, check the link between ETX-204A and the PC (physical path, configuration parameters, etc.)

Activating the SFTP Server

Once the SFTP server is activated on the PC, it waits for any SFTP file transfer request originating from the product, and carries out the received request automatically.

SFTP file transfers are carried out through TCP port 22. Make sure that the firewall you are using on the server allows communication through this port (refer to *Chapter 4* for details).

Activating the TFTP Server

Once the TFTP server is activated on the PC, it waits for any TFTP file transfer request originating from the product, and carries out the received request automatically.

TFTP file transfers are carried out through port 69. Make sure that the firewall you are using on the server allows communication through this port (refer to *Chapter 4* for details).

Note *Configure the connection timeout of the TFTP server to be more than 30 seconds to prevent an automatic disconnection during the backup partition deletion (about 25 seconds).*

Downloading the New Software Release File

This procedure is used to replace the current software version with the new software release.

➤ To copy the image file to the ETX-204A unit:

1. Navigate to the **file** context.
2. Enter:
   copy
   sftp://<**username**>**:**<password>@<ip-address>**/**<image-file-name>
   main-sw

   Where **ip-address** is the IP address of the PC where the SFTP server is installed.

   The software download begins. When the process is completed, use the **reboot** command in the **admin** context to restart ETX-204A, for the new software version to become active.

6.6 Upgrading the Device Software via the Boot Menu

Software downloading can also be performed using the Boot menu. The Boot menu can be reached while ETX-204A performs initialization, for example, after power-up.

You may need to start the loading from the Boot menu if you are unable to use the copy command (for example, because the ETX-204A software has not yet been downloaded or is corrupted).

Caution The Boot menu procedures are recommended only for use by authorized personnel, because this menu provides many additional options that are intended for use only by technical support personnel.

Two software downloading options are available from the Boot menu:

- Downloading using the XMODEM protocol. This is usually performed by downloading from a PC directly connected to the CONTROL DCE port of the unit.

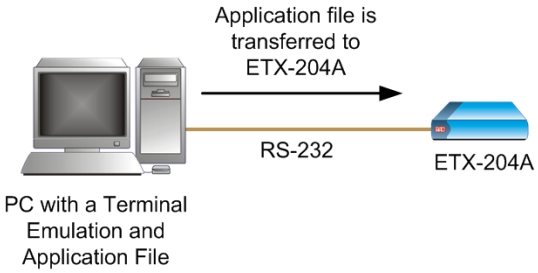


Figure 6-2. Downloading a Software Application File via XMODEM

- Downloading using TFTP. This is usually performed by downloading from a remote location that provides an IP communication path to an Ethernet port of ETX-204A.

Accessing the Boot Menu

The boot menu can be accessed when the device is powered up, before logging in.

➤ **To access the Boot menu:**

1. Configure the communication parameters of the selected PC serial port for asynchronous communication with 9,600 bps, no parity, one start bit, eight data bits and one stop bit. Turn all types of flow control off.
2. Turn off ETX-204A.
3. Activate the terminal application.
4. Turn on ETX-204A and immediately start pressing the **<Enter>** key several times in sequence until you see the Boot screen. A typical screen is shown below (the exact version and date displayed by your ETX-204A unit may be different).

Note *If you miss the timing, ETX-204A performs a regular reboot process (this process starts with **Loading** and ends with a message to press **<Enter>** a few times to display the login screen).*

```
Boot Version 3.00 (Mar 8 2009)
Boot Manager Version 10.06 (Mar 8 2009)

0 - Exit boot-manager
1 - Dir
2 - Set active software copy
3 - Delete software copy
4 - Download boot manager or an application by XMODEM
5 - Format Flash
6 - Show basic hardware information
7 - Reset board
8 - System configuration
9 - Download boot manager or an application by TFTP
Press the ESC key to return to the main menu

Select:
```

Figure 6-3. Boot Menu

Using the XMODEM Protocol

Use the following procedure to download software release 2.2 to ETX-204A via XMODEM.

➤ To download software release via XMODEM:

1. Verify that the image file is stored on the PC with the terminal application.
2. From the Boot menu (*Figure 6-3*), select Download Files or an Application by XMODEM.

   A message is displayed that requests the partition number to which the new software is to be downloaded, and offers a recommended value.
3. If there is no special reason to select a different value, type the recommended number and then press <Enter>. A typical display is shown below:

```
Select Copy number for download ( 1 )
Select: 1
```

4. The process starts, and the following is displayed:

```
Erasing Partition please wait ....
Please start the XMODEM download.
```

5. Start the transfer in accordance with the program you are using. For example, if you are using the Windows HyperTerminal utility:
   - Select Transfer in the HyperTerminal menu bar, and then select Send File on the Transfer menu.

     The Send File window is displayed:

- Select the prescribed ETX-204A software file name (you may use the **Browse** function to find it).
- In the **Protocol** field, select **Xmodem.**

- When ready, press **Send** in the **Send File** window.

  You can now monitor the progress of the downloading in the **Send File** window.

Note *If downloading fails, repeat the whole procedure.*

When the downloading process is successfully completed, a sequence of messages similar to the following is displayed:

```
Loading ...
Decompressing to RAM.

Processing archive: FLASH
Extracting ETX-204A.BIN.............................
.............................................................. CRC OK
Running ...
****************************************************************
* In order to start working - press the ENTER button for few times*
****************************************************************
```

6. At this stage, press the **<Enter>** key several times to go to the login screen.

Using TFTP

Use the following procedure to download software release 2.2 to ETX-204A via TFTP.

➤ **To download software release via TFTP:**

1. From the Boot menu (*Figure 6-3*), select **Download Files or an Application by TFTP**.

   The following message is displayed:

```
Enter TFTP timeout in case of failure [20 sec]:
```

2. Enter the amount of time to wait for the TFTP server.

   The following message is displayed:

```
Enter the target file name []:
```

3. Enter the name of the software image file.

   The following message is displayed:

```
Enter the server IP address []:
```

4. Enter the IP address of the PC where the TFTP server is installed.

If no errors are detected, the downloading process starts, and the screen displays its progress. After the image has been downloaded, use the **reboot** command in the **admin** context to reset ETX-204A in order to load the new release.

6.7 Verifying Upgrade Results

To verify that the upgrade was successful, log on to ETX-204A via HyperTerminal to view the Inventory table (**show inventory-table**) in the system context (**config>system**), and verify the active software version in the SW Rev column.

Chapter 7

Configuring Typical Applications

This chapter provides detailed instructions for setting up a typical application using ETX-204A units. Refer to *Chapter 4* for a detailed description of all configuration options available for ETX-204A.

7.1 Ethernet Private Line Application

Figure 7-1 illustrates a point-to-point application of an Ethernet private line over a WAN.

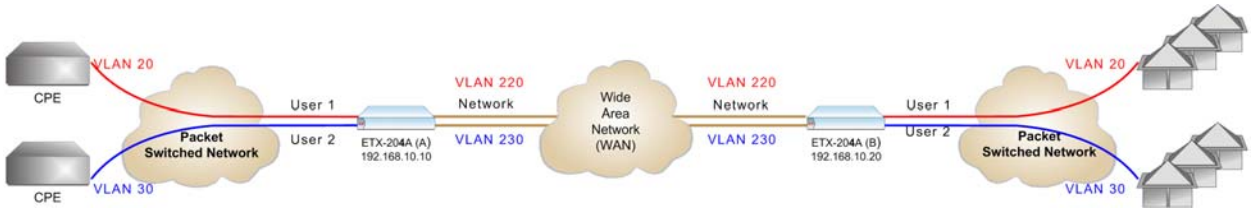


Figure 7-1. Point-to-Point Ethernet Private Line over Wide Area Network

In this application, ETX-204A (A) receives Ethernet user traffic separated by VLAN at both Gigabit Ethernet user ports, and transmits it over separate VLANs through the Wide Area network. ETX-204A (B) receives the user traffic separated by VLAN from the Wide Area network user traffic separated by VLAN, and transmits it via both Gigabit Ethernet user ports, separated by VLAN.

You must configure the following to deploy ETX-204A units in this application:

1. System parameters (host IP, default gateway)
2. Classifier profiles
3. Flows.

The default policer and queue map profiles are used when creating the flows. Refer to the descriptions of creating profiles in *Chapter 4* for information on the default profiles.

Table 7-1. System Configuration Summary, Point-to-Point Application

Device	Host IP	IP mask	Default Gateway
ETX-204A (A)	192.168.10.10	255.255.255.0	192.168.10.1
ETX-204A (B)	192.168.10.20	255.255.255.0	192.168.10.1

Table 7-2. Flow Configuration Summary, ETX-204A (A) and (B)

Flow ID	Ingress Port	Egress Port	Classification Criteria	Outer VLAN Action
11	User port 1	Network port 1	VLAN 20	Change to VLAN 220
12	Network port 1	User port 1	VLAN 220	Change to VLAN 20
13	User port 2	Network port 1	VLAN 30	Change to VLAN 230
14	Network port 1	User port 2	VLAN 230	Change to VLAN 30

Configuring Management Connectivity

The configuration procedure for system parameters is similar for both ETX-204A units, except for defining different host IP addresses.

➤ **To configure the host parameters at ETX-204A (A):**

- Execute the following script to disable DHCP and configure the host parameters as listed in *Table 7-1*.

```
configure management
      host 1
         no dhcp
         ip-address 192.168.10.10/24
         default-gateway 192.168.10.1
exit all
```

➤ **To configure the host parameters at ETX-204A (B):**

- Execute the following script at ETX-204A (B) to disable DHCP and configure the host parameters as listed in *Table 7-1*.

```
configure management
      host 1
         no dhcp
         ip-address 192.168.10.20/24
         default-gateway 192.168.10.1
exit all
```

Configuring Classifier Profiles

In both units, you have to create classifier profiles for VLANs 20, 30, 220, and 230. The same scripts can be used in both units, therefore they are presented here only once.

➤ **To create the classifier profile for VLAN 20:**

- Execute the following script to create the classifier profile for VLAN 20.

```
configure flows
      classifier-profile vlan20 match-any
      match vlan 20
exit all
```

➤ To create the classifier profile for VLAN 30:

- Execute the following script to create the classifier profile for VLAN 30.

```
configure flows
      classifier-profile vlan30 match-any
      match vlan 30
exit all
```

➤ To create the classifier profile for VLAN 220:

- Execute the following script to create the classifier profile for VLAN 220.

```
configure flows
      classifier-profile vlan220 match-any
      match vlan 220
exit all
```

➤ To create the classifier profile for VLAN 230:

- Execute the following script to create the classifier profile for VLAN 230.

```
configure flows
      classifier-profile vlan230 match-any
      match vlan 230
exit all
```

Configuring Flows

In both units, you have to create four flows, as flows are unidirectional (see *Table 7-2*)

- Flow 11 from user port 1 (ethernet 3) to network port 1 (ethernet 1), changing VLAN 20 to VLAN 220
- Flow 12 from network port 1 (ethernet 1) to user port 1 (ethernet 3), changing VLAN 220 to VLAN 20
- Flow 13 from user port 2 (ethernet 4) to network port 1 (ethernet 1), changing VLAN 30 to VLAN 230
- Flow 14 from network port 1 (ethernet 1) to user port 2 (ethernet 4), changing VLAN 230 to VLAN 30

The same scripts can be used in both units, therefore they are presented here only once.

➤ To create flow 11:

- Execute the following script to create flow 11 as shown in *Table 7-2*.

```
configure flows flow flow11
      classifier vlan20
      policer profile Policer1
      ingress-port ethernet 3
      egress-port ethernet 1 queue-map CosProfile1 block 0/1
      mark all
      vlan 220
      no shutdown
exit all
```

➤ To create flow 12:

- Execute the following script to create flow 12 as shown in *Table 7-2*.

```
configure flows flow flow12
      classifier vlan220
      policer profile Policer1
      ingress-port ethernet 1
      egress-port ethernet 3 queue-map CosProfile1 block 0/1
      mark all
      vlan 20
      no shutdown
exit all
```

➤ To create flow 13:

- Execute the following script to create flow 13 as shown in *Table 7-2*.

```
configure flows flow flow13
      classifier vlan30
      policer profile Policer1
      ingress-port ethernet 4
      egress-port ethernet 1 queue-map CosProfile1 block 0/1
      mark all
      vlan 230
      no shutdown
exit all
```

➤ To create flow 14:

- Execute the following script to create flow 14 as shown in *Table 7-2*.

```
configure flows flow flow14
      classifier vlan230
      policer profile Policer1
      ingress-port ethernet 1
      egress-port ethernet 4 queue-map CosProfile1 block 0/1
      mark all
      vlan 30
      no shutdown
exit all
```

Appendix A
Connection Data

A.1 10/100/1000BaseT Connector

The Ethernet electrical interface (10/100/1000BaseT) portion of the SFP/UTP combo ports terminates in 8-pin RJ-45 connectors, wired in accordance with *Table A-1*. The 10/100/1000BaseT connector supports both MDI and MDIX modes.

Table A-1. 10/100/1000BaseT Connector Pinout

Pin	MDI	MDIX
1	A+	B+
2	A-	B-
3	B+	A+
4	C+	D+
5	C-	D-
6	B-	A-
7	D+	C+
8	D-	C-

A.1 MNG Connector

The ETX-204A Ethernet management port uses an electrical interface that terminates in an RJ-45, 8-pin connector. The port supports MDI and MDIX modes. *Table A-2* lists the pin assignments.

Table A-2. MNG Pinout

Pin	Designation	Function
1	RxD+	Receive Data output, + wire
2	RxD–	Receive Data output, – wire
3	TxD+	Transmit Data input, + wire
4,5	–	Not connected

Pin	Designation	Function
6	TxD-	Transmit Data input, – wire
7,8	–	Not connected

A.2 CONTROL Connector

The control terminal interface terminates in a V.24/RS-232 9-pin D-type female DCE connector. *Table A-3* lists the CONTROL connector pin assignments.

Table A-3. CONTROL Connector Pinout

Pin	Function
1	–
2	Transmit Data (output)
3	Receive Data (input)
4, 5, 6, 7, 8, 9	–

A.1 EXT CLK Connector

The station clock port terminates in an 8-pin RJ-45 connector, wired in accordance with *Table A-4*.

Table A-4. EXT CLK Connector Pinout

Pin	Direction	Function
1,2	Input	T3 (Input)
3	–	Not connected
4,5	Output	T4 (Output)
6, 7, 8	–	Not connected

Appendix B

Operation, Administration, and Maintenance (OAM)

B.1 Introduction

ETX-204A supports standard implementation of Ethernet OAM based on ITU-T Y.1731 and IEEE 802.1ag-D8. Pre-standard implementation based on Y.1731 is supported for backward compatibility, for instance when working opposite a device with an older version of Ethernet OAM software. This appendix describes the pre-standard implementation. The standard implementation can be found in the ITU-T Y.1731 and IEEE 802.1ag-D8 documentation.

The pre-standard OAM implementation provides the following::

- Continuity check
- Non-intrusive loopback which used to detect loss of bidirectional continuity
- Performance measurements (per service).

Table B-1 lists the Ethernet OAM-related terms used in the appendix.

Table B-1. Ethernet OAM Terminology

Term	Description
UNI	User Network Interface. The physical demarcation point between the responsibility of the Service Provider and the responsibility of the Subscriber
UNI_C	Customer side of a UNI link
UNI_N	Network side of a UNI link
Service frame	An Ethernet frame transmitted across the UNI toward the Service Provider or an Ethernet frame transmitted across the UNI toward the Subscriber.
Flow	Ethernet Virtual Connection : An association of two or more UNIs that limits the exchange of Service Frames to UNIs in the Ethernet Virtual Connection
Point-to-point Flow	Flow connecting exactly two UNIs

Term	Description
Multipoint-to-Multipoint Flow	Flow connecting two or more UNIs
Service Instance / Class of service (CoS)	A set of Service Frames that have a commitment from the Service Provider to receive a particular level of performance
Service Instance Identifier (CoS ID)	Service Frame delivery performance is specified for all Service Frames transported within a flow with a particular Class of Service instance. The Class of Service instance is identified by a Class of Service Identifier associated with each Service Frame (Class of service can be identified by more than one parameter/frame attribute)
MEP	Proactive OAM reference point which is capable to initiate and terminate proactive OAM frames. MEP is also capable to initiate and react to diagnostics OAM frames.
MIP	A provisioned OAM reference point which is capable to respond to diagnostics OAM frames initiated by the MEP.
MEP Service Instance Source	The receiver of OAM frames in each Service Instance
MEP Service Instance Destination	The transmitter of OAM frames in each Service Instance

B.2 Reference Architecture

Figure B-1 illustrates two OAM flows:

- OAM flow originating from the CPE

  The CPE-to-CPE OAM flow is transferred transparently by ETX-204A and treated as data.

- OAM flow originating from the ETX-204A devices.

  The ETX-204A OAM flow runs on a data flow on the same VLAN.
  The ETX-204A units terminate the OAM flow and can be referred as a Maintenance Entity (ME). Each device supports up to 8 such MEs. In this case, the ETX-204A units act as MEPs (Maintenance End-Points) and not as a MIP (Maintenance Intermediate Points) and all measurements are performed on the UNI_N to UNI_N segment.

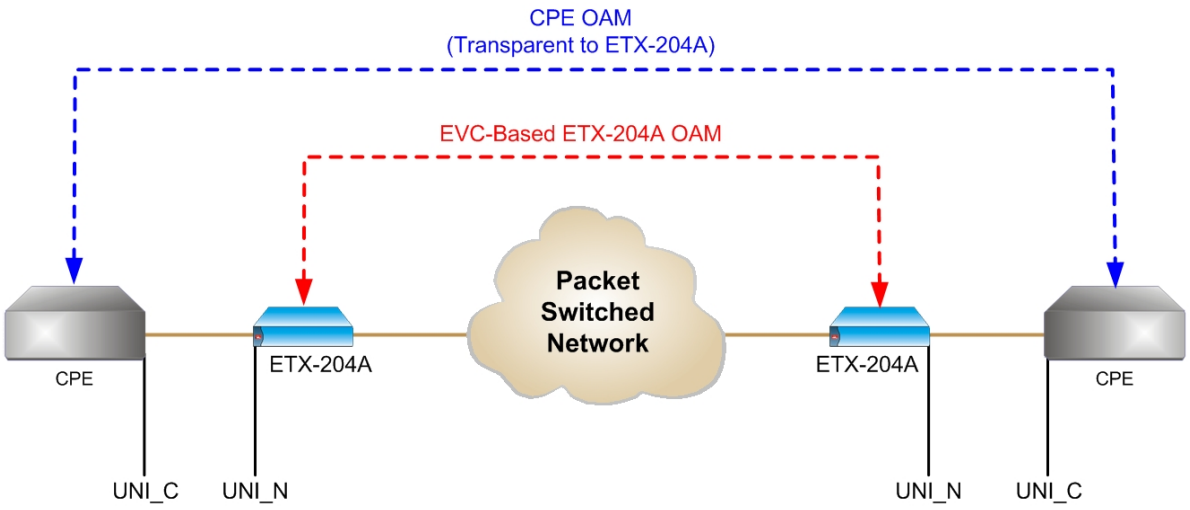


Figure B-1. OAM Architecture

Handling of OAM Levels

UNI_C to UNI_N Direction

In the UNI_C to UNI_N direction ETX-204A blocks all OAM messages with OAM level greater than 2. Messages with other OAM levels are passed transparently.

Network Ingress to UNI_N Direction

All OAM messages coming from the network ingress with the device MAC address or with the special OAM multicast address are sent to the CPU. All other OAM messages are passed transparently to the user ports as per the respective flow definition.

B.3 OAM Entities

This section describes the OAM entities hierarchy. *Figure B-2* illustrates the relationship between UNI, flow and Service Instance (COS ID), when one or more service instances belong to one flow and one or more flow belong to a UNI. From the OAM perspective, the continuity messages and defects are activated per flow, and the PM is activated per service instance.

Note *A flow can belong only to one UNI in the same ETX-204A.*

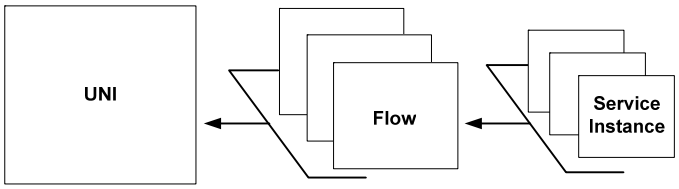


Figure B-2. UNI, Flow and Service Instance (COS ID)

Figure B-3, *Figure B-4* and *Figure B-5* illustrate different combinations of UNIs, flows and service instances. Each UNI contains at least one flow, which contain at least one service instance.

- In the one flow per UNI case (*Figure B-3*), the PM and CC are transmitted once.

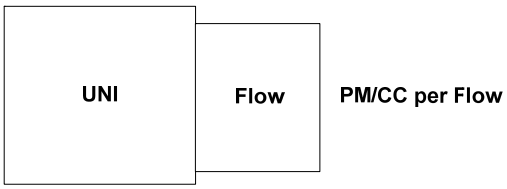


Figure B-3. One Flow per UNI

- In case of multiple flows per UNI (*Figure B-4*), PM and CC are transmitted three times.

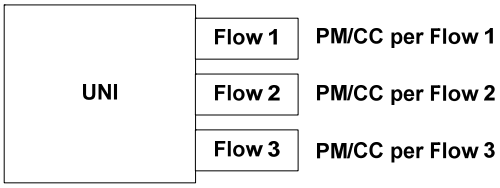


Figure B-4. Multiple Flows per UNI

- In case of one flow and multiple CoS (Service Instances) per UNI (*Figure B-5*), the PM is transmitted three times and the CC – once.

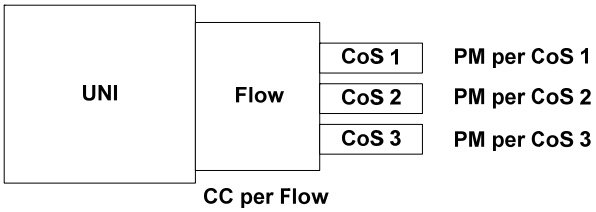


Figure B-5. One Flow and Multiple CoS (Service Instances) per UNI

B.4 OAM Flows

Figure B-6 illustrates a typical OAM traffic flow. The OAM message is transmitted from the source MEP 1 to the destination MEP 2 and the reply is transmitted back The source is also a destination for messages from the other direction.

The OAM interval is one second, so each NTU transmits one request and one reply and receive one request and one reply. Total of four messages are transmitted per second per service instance.

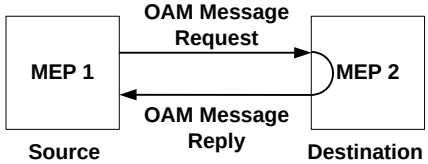


Figure B-6. OAM Flow

OAM Message Addressing

The OAM defines two modes of addressing, unicast and multicast. Unicast addressing is used for point-to-point connections, while multicast addressing is used in cases where the MAC address of the destination MEP is not known. Currently ETX-204A supports point-to-point flows in proprietary mode.

OAM Message Association

On the receiver side the OAM frame is associated with a flow and a service.

Flow Association

When an OAM frame is associated with a flow, the following steps are performed:

- Request message reception

  When a request message is received, the VLAN is extracted to find the Flow ID. The Flow ID found at the receiver is compared against the Flow ID in the frame. If the IDs are equal, further service association is made. If it is not found, the "Flow ID no match" notification is returned in the reply message.

- Reply message reception

  When a reply message is received, the VLAN is extracted to find the Flow ID. The Flow ID found at the receiver is compared against the Flow ID in the frame. If the IDs are equal, further service association is made. If it is not found, the frame is discarded and connectivity alarm is issued.

Service Association

When an OAM frame is associated with a service, the following steps are performed:

- Request message reception

  The class of service characteristics are extracted from the frame and must be matched to an entry in the flows <-> services table at the receiver. If they are matched, the frame is processed. If not, the service ID is returned with the "Not Found" notification.

- Reply message reception

  The class of service characteristics are extracted from the frame and must be matched to an entry in the flow <-> services table at the receiver. If they are matched, the frame is processed. If not, the frame is discarded.

Ethernet Loopback (ETH-LB)

The ETH-LB can be used to verify connectivity. The ETH-LB is performed by sending a request ETH-LB message to the remote unit and expecting an ETH-LB reply message back to verify connectivity. When the insertion rate of ETH-LB messages is much slower compared to data rate between the flow points.

Unicast ETH-LB request message is sent from a MEP to a specific MEP (remote device). The DA of the request message is a unicast MAC address of destination device. Upon receipt of the request message, the MEP responds with unicast ETH-

LB reply message. The DA of the reply message is a unicast MAC address of requesting device, learned from request message.

Continuity Check (ETH-CC)

Ethernet Continuity Check (ETH-CC) can be used to detect continuity failures across flows between a given pair of edge service point on a flow. Continuity failures are caused by:

- Major failures (link failure, device failure, network path failure etc)
- Minor failures (software failure, memory corruption, incorrect configuration etc).

The ETH-CC signal is generated by one MEP. Upon receipt of the first ETH-CC signal from a sending MEP, the receiving MEP detects continuity with sending MEP and expects to receive further periodic ETH-CC signals. Once the receiving MEP stops receiving periodic ETH-CC signals from sending MEP, it declares continuity failure.

OAM Procedures

This section discusses the continuity check (CC) and the performance measurement (PM) procedures.

Continuity Check Procedure

The loopback message and the ETH-CC messages are used for continuity check. In case the services are defined and PM collection is enabled, they are also used to carry PM messages. If PM collection is disabled, the messages are used for continuity check only.

If the RX CC mode of the receiver is configured to CC-based, the continuity detection is based on ETH-CC. If the mode is set to LB-based, the continuity detection is based on ETH-LB. If the mode is disabled, the continuity detection is not performed.

ETH-LB Method

The ETH-LB method includes the following elements:

- Unicast ETH-LB transmission

  Unicast ETH-LB request message is transmitted by a MEP (ETX-204A) every 1 second. The transmitted Transaction Identifier is retained for at least 5 seconds after the unicast ETH-LB signal is transmitted. The Transaction Identifier must be changed for every unicast ETH-LB message, and no Transaction Identifier from the same MEP is allowed to be repeated within 1 minute.

- Unicast ETH-LB reception and reply transmission

  Whenever a valid unicast ETH-LB request message is received by MEP (ETX-204A), a unicast ETH-LB reply message is generated and transmitted to the requesting MEP. Every field in the unicast ETH-LB request message is copied to the unicast ETH-LB reply message with the following exceptions:

- The source and destination MAC addresses are swapped.
- The OpCode field is vendor-specific 0xFE.
- The Flow and MEP ID are processed as follows: if the Flow/MEP ID do not exist in the device, it changes them to "No Match" otherwise they are left intact.

- Unicast ETH-LB reply receipt

  When a unicast ETH-LB reply message is received by a MEP (ETX-204A) diagnostic flow termination function, it examines the TLVs returned in the unicast ETH-LB reply message. The signal is declared invalid if the TLVs do not match those sent in the corresponding unicast ETH-LB request signal, including MEP ID and Flow ID.

- Continuity declarations

  Loss of Continuity and Connectivity Mismatch states are declared by the ETH-LB mechanism.

  - Loss of continuity declaration

    After the source device sends an ETH-LB message a timer is set with a 3.52 second timeout. If the destination device does send reply within the timeout, the source enters the loss of continuity state. Upon reply from the destination, the source resets the timer to 3.52 seconds. Regarding the continuity check message, the source checks only the Flow ID with the MEP ID. When the source enters the loss of continuity state, it adds 24 to Unavailable Seconds counter. The 3.52 second period is calculated as a sliding window.

    Loss of continuity state is cleared after 3.52 seconds with at least 21 reply messages from the destination. In this case the Unavailable Seconds counter decreased by 24.

  - Connectivity mismatch declaration

    If the source Flow ID is not equal to the destination Flow ID as recorded in the reply message for 10 consecutive times, the source enters in to misconnection state.

    Misconnection state is cleared after 10 consecutive reply messages with the correct flow name from the destination.

    The Unavailable counter is maintained by the service according to the number of PM messages that did not receive replies. If a mismatch notification is received to the LB request, the frame is dropped and reply message is not sent. This is why the service becomes unavailable (no reply) in case of mismatch and the unavailable counter is raised.

ETH-CC Method

The ETH-CC method includes the following elements:

- ETH-CC transmission

  Unicast ETH-CC request message is transmitted by a MEP (ETX-204A) every 1 second. The transmitted Transaction Identifier is retained for at least 5 seconds after the unicast ETH-CC signal is transmitted. The Transaction Identifier must be changed for every Unicast ETH-CC message, and no

Transaction Identifier from the same MEP is allowed to be repeated within 1 minute.

- Unicast ETH-CC reply receipt

  When a unicast ETH-CC message is received by a MEP (ETX-204A) diagnostic flow termination function, it examines the TLVs returned in the unicast ETH-CC message, and declares the signal invalid if the TLVs do not match those sent in the corresponding exiting MEP ID and Flow ID.

- Continuity declarations

  Loss of Continuity and Connectivity Mismatch states are declared by the ETH-CC mechanism.

  - Loss of continuity declaration

    When the MEP receives the ETH-CC message a timer is set with a 3.5 seconds timeout. If the source does send another message during this period, the destination enters the loss of continuity state. Upon receipt of the ETH-CC message, the destination resets the timer to 3.5 seconds. Regarding the continuity check message, the destination check the Flow ID and the MEP ID. When the destination enters the loss of continuity state, it adds 4 to the Unavailable Seconds counter. The 3.5 second period is calculated as a sliding window.

    Loss of continuity state is cleared after 3.5 seconds with at least 2 messages from the source. In this case the Unavailable Seconds counter is decreased by 4.

  - Connectivity mismatch declaration

    If the source Flow ID is not equal to the destination Flow ID for 10 consecutive times, the destination enters in to misconnection state.

    Misconnection state is cleared after 10 consecutive reply messages with the correct flow name from the source.

    The Unavailable counter is maintained by the service according to the number of PM messages that did not receive replies. If a mismatch notification is received to the LB request, the frame is dropped and reply message is not sent. This is why the service becomes unavailable (no reply) in case of mismatch and the unavailable counter is raised.

Performance Measurement

For details on OAM statistic counters, refer to *Chapter 5*.

Supplement

AC/DC Adapter (AD) Plug

for DC Power Supply Connection

Note *Ignore this supplement if the unit is AC-powered.*

Certain units are equipped with a wide-range AC/DC power supply. These units are equipped with a standard AC-type 3-prong power input connector located on the unit rear panel. This power input connector can be used for both AC and DC voltage inputs.

For DC operation, a compatible straight or 90-degree AC/DC Adapter (AD) plug for attaching to your DC power supply cable is supplied with your RAD product (see *Figure 1* and *Figure 2*).

Connect the wires of your DC power supply cable to the AD plug, according to the voltage polarity and assembly instructions provided on *page 2*.

Figure 1. Straight AD Plug

Figure 2. 90-Degree AD Plug

Caution

Prepare all connections to the AD plug **before** inserting it into the unit's power connector.

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➤ **To prepare the AD plug and connect it to the DC power supply cable:**

1. Loosen the cover screw on the bottom of the AD plug to open it (see *Figure 3*).
2. Run your DC power supply cable through the removable cable guard and through the open cable clamp.
3. Place each DC wire lead into the appropriate AD plug wire terminal according to the voltage polarity mapping shown. Afterwards, tighten the terminal screws closely.
4. Fit the cable guard in its slot and then close the clamp over the cable. Tighten the clamp screws to secure the cable.
5. Reassemble the two halves of the AD plug and tighten the cover screw.
6. Connect the assembled power supply cable to the unit.

***Note**: You have to flip over the non-90-degree AD plug type by 180 degrees to insert it into the unit. After inserting it, verify that the blue (negative) wire is connected to the POWER and the brown (positive) wire is connected to the RETURN.*

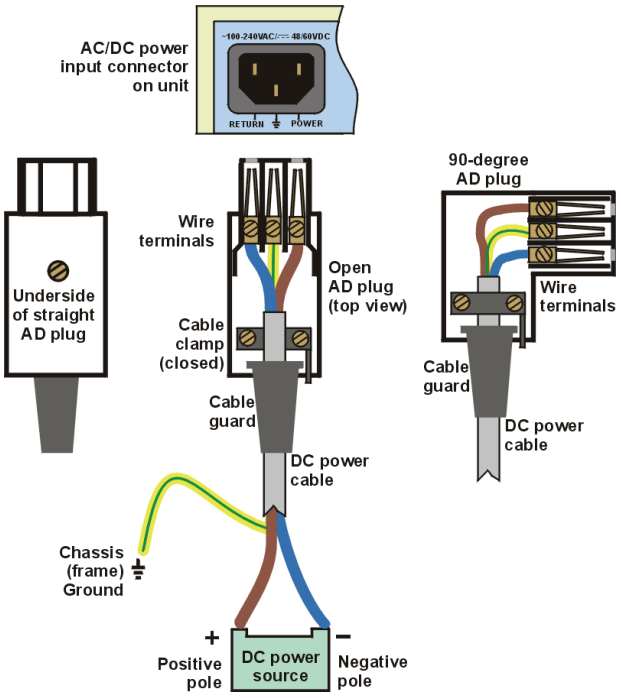

Figure 3. AD Plug Details

Warning

- **Reversing the wire voltage polarity will not cause damage to the unit, but the internal protection fuse will not function.**
- **Always connect a ground wire to the AD plug's chassis (frame) ground terminal. Connecting the unit without a protective ground, or interrupting the grounding (for example, by using an extension power cord without a grounding conductor) can damage the unit or the equipment connected to it!**
- **The AD adapter is not intended for field wiring.**

Supplement

Terminal Block Connector

for DC Power Supply Connection

Note *Ignore this supplement if the unit is AC-powered.*

Certain DC-powered units are equipped with a plastic 3-pin VDC-IN power input connector, located on the unit rear panel. Different variations of the connector are shown in *Figure 1*. All are functionally identical.

Supplied with such units is a kit including a mating Terminal Block (TB) type connector plug for attaching to your power supply cable.

Connect the wires of your power supply cable to the TB plug, according to the voltage polarity and assembly instructions provided on the following pages.

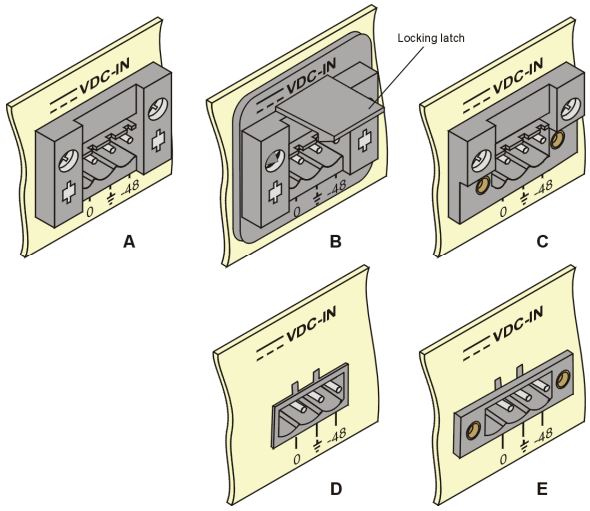

Figure 1. TB DC Input Connector Types Appearing on Unit Panels

Caution

Prepare all connections to the TB plug **before** inserting it into the unit's VDC-IN connector.

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➤ **To prepare and connect the power supply cable with the TB Plug:**

***Note**: Refer to Figure 2 for assistance.*

1. Strip the insulation of your power supply wires according to the dimensions shown.
2. Place each wire lead into the appropriate TB plug terminal according to the voltage polarity mapping shown in *Figure 3*. (If a terminal is not already open, loosen its screw.) Afterwards, tighten the three terminal screws to close them.
3. Pull a nylon cable tie (supplied) around the power supply cable to secure it firmly to the TB plug grip, passing the tie through the holes on the grip.
4. Isolate the exposed terminal screws/wire leads using a plastic sleeve or insulating tape to avoid a short-circuit.
5. Connect the assembled power supply cable to the unit by inserting the TB plug into the unit's VDC-IN connector until it snaps into place.

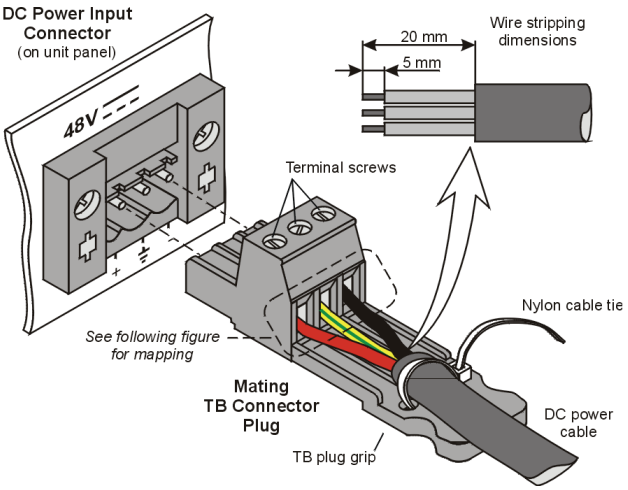

Figure 2. TB Plug Assembly

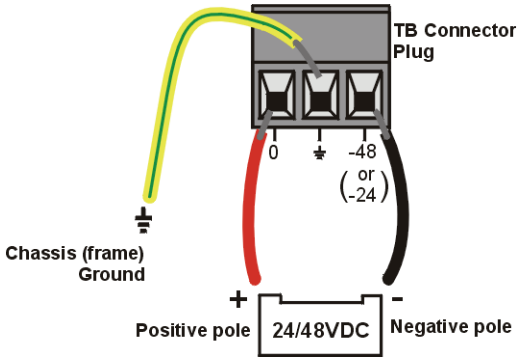

Figure 3. Mapping of the Power Supply Wire Leads to the TB Plug Terminals

Warning

- **Reversing the wire voltage polarity can cause damage to the unit!**
- **Always connect a ground wire to the TB plug's chassis (frame) ground terminal. Connecting the unit without a protective ground, or interruption of the grounding (for example, by using an extension power cord without a grounding conductor) can cause harm to the unit or to the equipment connected to it!**

***Note**: Certain TB plugs are equipped with captive screws for securing the assembled cable's TB plug to the unit's VDC-IN connector (C and E types only). To secure the plug, tighten the two screws on the plug into the corresponding holes on the sides of the input connector as shown in Figure 4.*

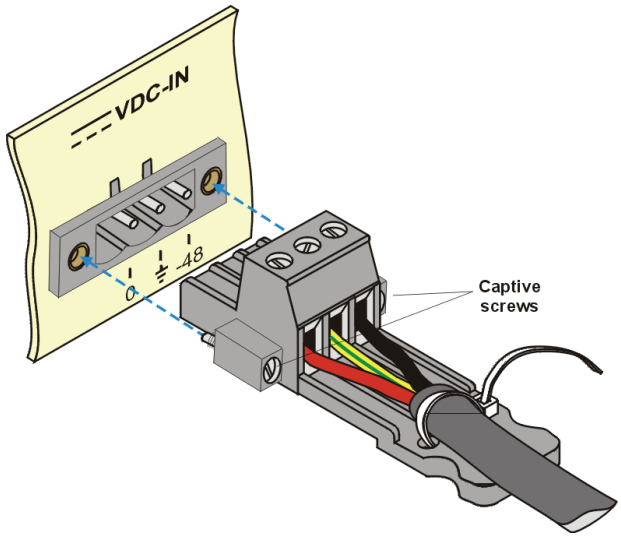

Figure 4. TB Plug with Captive Screws (optional)

➤ **To disconnect the TB plug:**

1. If the TB plug is equipped with captive screws, loosen the captive screws (see *Figure 4*).
2. If the unit's VDC-IN connector is type B, lift the locking latch (see *Figure 1*).
3. Pull out the TB plug carefully.

Caution Always lift the locking latch of type B connectors before disconnecting the TB plug, to avoid damaging the TB plug.

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Publication No. 254-200-04/10

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